We create chemistry

Sikkerhedsdatablad

PUNKT 1: Identifikation af stoffet/blandingen og af selskabet/virksomheden

1.1. Produktidentifikator

THORO GLAZE SG

Produktregistreringsnummer: 2339113

1.2. Relevante identificerede anvendelser for stoffet eller blandingen samt anvendelser, der frarådes

Relevante identificerede anvendelser: Produkt til bygningskemikalier

1.3. Nærmere oplysninger om leverandøren af sikkerhedsdatabladet

Firma:
BASF SE
67056 Ludwigshafen
GERMANY

Kontaktadresse:
BASF A/S
Ved Stadsgraven 15
2300 København S
DENMARK

Telefon: +45 32 6-60700
e-mail adresse: product-safety-north@basf.com

1.4. Nødtelefon

Giftlinjen: +45 82121212, 24-timers service 7 dage om ugen
International emergency number:
Telefon: +49 180 2273-112

PUNKT 2: Fareidentifikation

2.1. Klassificering af stoffet eller blandingen

I henhold til Forordning (EF) Nr. 1272/2008 [CLP]

Produktet er ikke klassificeringspligtigt i henhold til GHS kriterierne.

I henhold til direktiv 67/548/EØF eller 1999/45/EF

Mulige farer:
Ingen særlige farer er kendt, når forskrifterne/anvisningerne for lagring og omgang bliver overholdt.

2.2. Mærkningselementer

I henhold til Forordning (EF) Nr. 1272/2008 [CLP]

Produktet er ikke mærkningspligtigt i henhold til GHS kriterierne.

Mærkning af specielle præparater (GHS):
EUH208: Kan udløse allergisk reaktion. Indeholder: BLANDING: 5-CHLOR-2-METHYL-2H-ISOTHIAZOL-3-ON (3:1) MED 2-METHYL-2H-ISOTHIAZOL-3-ON

I henhold til direktiv 67/548/EØF eller 1999/45/EF

EU-direktiv 1999/45/EF ('Præparatdirektivet')

Produktet er ifølge EU-direktiver ikke mærkningspligtig.

2.3. Andre farer

I henhold til Forordning (EF) Nr. 1272/2008 [CLP]

Hvis passende er information angivet i denne sektion om andre farer, der ikke resulterer i klassificering, men som kan bidrage til de overordnede farer af stoffet eller blandingen.

PUNKT 3: Sammensætning af/oplysning om indholdsstoffer

3.1. Stoffer

Ikke anvendelig.

3.2. Blandinger

Kemisk beskrivelse

Vandig dispersion af polymerer baseret på: acrylater, modificeret

Farlige indholdsstoffer (GHS)
I henhold til Forordning (EF) Nr. 1272/2008

1,2-ethandiol (ethylenglycol) (glykol)

Indhold (W/W): < 3 % | Acute Tox. 4 (oral)
CAS-nummer: 107-21-1 | STOT RE (Nyre) 2
EF-nummer: 203-473-3 | H302, H373
REACH registreringsnummer: 01-2119456816-28
INDEX-nummer: 603-027-00-1

isosmørsyre, monoester med 2,2,4-trimethylpentan-1,3-diol

Indhold (W/W): < 3 % | Aquatic Chronic 3
CAS-nummer: 25265-77-4 | H412
EF-nummer: 246-771-9
REACH registreringsnummer: 01-2119441305-48

Farlige indholdsstoffer
i henhold til Direktiv 1999/45/EF

1,2-ethandiol (ethylenglycol) (glykol)

Indhold (W/W): < 3 %
CAS-nummer: 107-21-1
EF-nummer: 203-473-3
REACH registreringsnummer: 01-2119456816-28
INDEX-nummer: 603-027-00-1
Faresymbol(er): Xn
R-Sætning(er): 22, 48/22

isosmørsyre, monoester med 2,2,4-trimethylpentan-1,3-diol

Indhold (W/W): < 3 %
CAS-nummer: 25265-77-4
EF-nummer: 246-771-9
REACH registreringsnummer: 01-2119441305-48
R-Sætning(er): 52/53

adipohydrazid

Indhold (W/W): < 0,3 %
CAS-nummer: 1071-93-8
EF-nummer: 213-999-5
Faresymbol(er): N
R-Sætning(er): 51/53

For de klassificeringer, der ikke er fuldt angivet i dette afsnit, inklusiv farebetegnelser, faresymboler, R-sætninger og H-sætninger er den fulde ordlyd anført i afsnit 16.

PUNKT 4: Førstehjælpsforanstaltninger

4.1. Beskrivelse af førstehjælpsforanstaltninger

Førstehjælperen skal tage hensyn til egen sikkerhed. Forurenet tøj fjernes straks.

Efter indånding:
Ved ubehag efter indånding af dampe/aerosoler: Frisk luft, lægehjælp.

Ved hudkontakt:
Kommer stoffet på huden vaskes straks med store mængder sæbe og vand. Benyt under ingen omstændigheder opløsningsmidler. Ved irritation - søg læge.

Ved kontakt med øjnene:
Skyl grundigt i 15 minutter under rindende vand med åbne øjne, kontrol hos øjenlæge.

Ved indtagelse:
Skyl straks munden og drik rigeligt med vand, tilkald lægehjælp. Fremkald ikke opkastning uden at have fået besked derpå af giftkontrolcenter eller læge.

4.2. Vigtigste symptomer og virkninger, både akutte og forsinkede
Symptomer: De vigtigste kendte symptomer og virkninger er beskrevet i mærkningen af produktet(se afsnit 2) og/eller i afsnit 11.

4.3. Angivelse af om øjeblikkelig lægehjælp og særlig behandling er nødvendig
Behandling: Symptomatisk behandling (dekontamination, vitalfunktionen), ingen specifik modgift kendes.

PUNKT 5: Brandbekæmpelse

5.1. Slukningsmidler
Egnet slukningsmiddel:
skum, vandforstøvningsstråle, tørpulver, kuldioxid

Slukningsmidler som af sikkerhedsgrunde ikke må anvendes:
vandstråle

5.2. Særlige farer i forbindelse med stoffet eller blandingen
carbondioxid, carbonmonoxid; kulilte, sundhedsskadelige dampe, nitrogenoxid, røg, sod

5.3. Anvisninger for brandmandskab
Særlig beskyttelsesudrustning:
Brug luftforsynet åndedrætsværn.

Øvrigt:
Faren afhænger af de brændende stoffer og brandbetingelserne. Beholdere som udsættes for varme, afkøles med vand. Kontamineret slukningsvand skal opsamles separat, må ikke udledes i kloak eller spildevand. Kontamineret slukningsvand skal bortskaffes i overensstemmelse med de lokale myndigheders forskrifter.

PUNKT 6: Forholdsregler over for udslip ved uheld

6.1. Personlige sikkerhedsforanstaltninger, personlige værnemidler og nødprocedurer

Undgå indånding af dampe/aerosol/sprøjtetåge. Brug beskyttelsesbriller/ansigtsskærm under arbejdet. Forlad øjeblikkeligt området ved eksponering for høje dampkoncentrationer. Anvend personlig beskyttelsesdragt. Behandles i overensstemmelse med god industriel hygiejne og sikkerhedsforanstaltninger for kemiske byggematerialer.

6.2. Miljøbeskyttelsesforanstaltninger

Forurenet vand/slukningsvand opsamles. Må ikke komme i kloakanlæg/overfladevand/grundvand.

6.3. Metoder og udstyr til inddæmning og oprensning

Ved små mængder: Optages med inert absorberende materiale (f.eks. sand, jord, etc.). Forurenet materiale bortskaffes efter forskrifterne.
Ved store mængder: Produktet pumpes bort.

6.4. Henvisning til andre punkter

Information om eksponeringskontrol/personlige værnemidler og forhold vedrørende bortskaffelse kan findes i sektion 8 og 13.

PUNKT 7: Håndtering og opbevaring

7.1. Forholdsregler for sikker håndtering

Undgå aerosoldannelse. Undgå indånding af tåger, dampe. Undgå hudkontakt. Ved forskriftsmæssig anvendelse er ingen særlige forholdsregler påkrævet.

7.2. Betingelser for sikker opbevaring, herunder eventuel uforenelighed

Yderligere oplysninger til lagringsbetingelserne: Må kun opbevares i originalemballagen på et køligt, godt ventileret sted og adskilt fra antændingskilde, varme, og flamme. Beskyttes mod direkte solpåvirkning.

Lagerstabilitet:
lagertemperatur: 5 - 30 °C

7.3. Særlige anvendelser

For de relevante indentificerede anvendelser listet i afsnit 1, skal de nævnte anvisninger i dette afsnit 7 iagttages.

PUNKT 8: Eksponeringskontrol/personlige værnemidler

8.1. Kontrolparametre

Indholdsstoffer hvis grænseværdier skal overholdes på den enkelte arbejdsplads

107-21-1: 1,2-ethandiol (ethylenglycol) (glykol)
Tidsvægtet gennemsnitsgrænseværdi 26 mg/m3 ; 10 ppm (GV (DK))
Tidsvægtet gennemsnitsgrænseværdi 10 mg/m3 (GV (DK)), Aerosoltåger
Effekt på huden (GV (DK))
Stoffet kan absorbes via huden.
Tidsvægtet gennemsnitsgrænseværdi 52 mg/m3 ; 20 ppm (OEL (EU))
indikativ
STEL værdi 104 mg/m3 ; 40 ppm (OEL (EU))
indikativ
Effekt på huden (OEL (EU))
Stoffet kan absorbes via huden.

8.2. Eksponeringskontrol

Personlige værnemidler

Beskyttelse af åndedrætsorganer:
Åndedrætsværn ved utilstrækkelig udluftning. Kombinationsfilter for organiske, uorganiske, sure uorganiske og basiske gasser/dampe (f.eks. EN 14387 type ABEK).

Beskyttelse af hænder:
uigennemtrængelige handsker
handsker af syntetisk gummi
På grund af store typeforskelle skal leverandørens anvisninger følges.

Beskyttelse af øjne:
Beskyttelsesbriller med sideskærme (stelbriller) (f.eks. EN 166)

Beskyttelse af hud:
let beskyttelsesdragt

Generelle beskyttelses- og hygiejneforanstaltninger
Indånd ikke gasser/dampe/aerosoler. Undgå berøring med hud, øjne og beklædning. Undgå enhver kontakt - indhent særlige anvisninger før brug. Behandles i overensstemmelse med god industriel hygiejne og sikkerhedsforanstaltninger for kemiske byggematerialer. Det anbefales at benytte tæt arbejdsbeklædning. Der må ikke spises, drikkes eller ryges under brug. Hænder og/eller ansigt vaskes før pauser og ved arbejdstidens ophør. Efter arbejde sørg for rengøring af huden samt hudpleje. Handsker skal testes regelmæssigt og før brug. Hvis nødvendigt skal de skiftes ud (f.eks. ved små huller).

PUNKT 9: Fysisk-kemiske egenskaber

9.1. Oplysninger om grundlæggende fysiske og kemiske egenskaber

Fysisk form:	flydende
Farve:	transparent
Lugt:	Karakteristisk
Lugtgrænse:	
	Ingen relevant information tilrådighed.

pH-værdi:	9 (20 °C)
Information om: vand	
Smeltepunkt:	*0 °C*
---	---
Kogepunkt:	> 100 °C
Information om: vand	
Kogepunkt:	*100 °C*
---	---
Flammepunkt:	> 100 °C
Fordampningshastighed:	
	ikke bestemt
Antændelighed:	ikke antændelig
Information om: vand	
Damptryk:	*23,4 hPa* *(20 °C)* *Litteraturangivelse.*
---	---
Densitet:	1,025 g/cm3 (20 °C)
Relativ damptæthed (luft):	
	ikke bestemt
Opløselighed i vand:	opløselig (20 °C)
Selvantændelighed:	ikke selvantændelig
Termisk nedbrydning:	Ingen nedbrydning, når forskrifter/henvisninger vedr. lagring og håndtering overholdes.
eksplosionsfare:	ikke eksplosiv

Brandnærende egenskaber: ikke brandfremmende

9.2. Andre oplysninger

Pakkefylde:	
	ikke anvendelig
Hygroskopi:	ikke hygroskopisk

Andre oplysninger:
Hvis nødvendigt er andre fysiske og kemiske egenskaber angivet i dette afsnit.

PUNKT 10: Stabilitet og reaktivitet

10.1. Reaktivitet
Ingen farlig reaktioner, hvis forskrifter/henvisninger for lagring og håndtering overholdes.

10.2. Kemisk stabilitet
Produktet er stabilt ved overholdelse af foreskrifterne/anvisningerne om lagring og håndtering.

10.3. Risiko for farlige reaktioner
Produktet er stabilt ved overholdelse af foreskrifterne/anvisningerne om lagring og håndtering.

10.4. Forhold, der skal undgås
Se afsnit 7 i sikkerhedsdatabladet - Håndtering og opbevaring.

10.5. Materialer, der skal undgås

Materialer, der skal undgås:
stærke syrer, stærke baser, stærke oxidationsmidler, stærke reduktionsmidler

10.6. Farlige nedbrydningsprodukter

Ingen farlige nedbrydningsprodukter ved forskriftmæssig opbevaring og håndtering.

PUNKT 11: Toksikologiske oplysninger

11.1. Oplysninger om toksikologiske virkninger

Akut toksicitet

Vurdering af akut toksicitet:
I praksis ikke toksisk ved én enkel oral indtagelse. Baseret på tilgængelige data er klassificeringskriterierne ikke opfyldt.

Irritation

Vurdering af irritationseffekt:
Ved tilsigtet brug og korrekt håndtering forventes ingen irritation. Baseret på tilgængelige data er klassificeringskriterierne ikke opfyldt.

Sensibilisering ved indånding/hudsensibilisering

Vurdering af sensibilitet:
En sensibiliserende effekt på særligt sensitive personer kan ikke udelukkes. Produktet er ikke blevet testet. Oplysningerne er afledt af enkeltkomponenternes egenskaber.

Kimcellemutagenicitet

Bedømmelse mutagenitet:
Den kemiske struktur giver ikke anledning til mistanke om en sådan virkning. Baseret på tilgængelige data er klassificeringskriterierne ikke opfyldt.

Carcinogenitet

Bedømmelse carcinogenitet:
Den kemiske struktur giver ikke anledning til mistanke om en sådan virkning. Baseret på tilgængelige data er klassificeringskriterierne ikke opfyldt.

reproduktionstoksicitet

Vurdering af reproduktionstoksicitet:
Den kemiske struktur giver ikke anledning til mistanke om en sådan virkning. Baseret på tilgængelige data er klassificeringskriterierne ikke opfyldt.

Udviklingstoksicitet

Vurdering af teratogenicitet:
Den kemiske struktur giver ikke anledning til mistanke om en sådan virkning. Baseret på tilgængelige data er klassificeringskriterierne ikke opfyldt.

Toksicitet ved gentagen dosering og specifik målorgantoksicitet (gentagen eksponering)

Vurdering af toksicitet ved gentagen dosering:
Der foreligger ikke valide studier om toksisitet ved gentagen eksponering. Baseret på tilgængelige data er klassificeringskriterierne ikke opfyldt.

Andre relevante informationer om toksicitet

Ved forskriftsmæssig omgang og hensigtsmæssig anvendelse forårsager produktet ifølge vore erfaringer ingen sundhedsskadelige virkninger. Produktet er ikke blevet testet. De toksikologiske data er udledt af de enkelte komponenters egenskaber.

Indeholder et organisk opløsningsmiddel, som kan give risiko for skader på en række organer, herunder hjerneskade (Danmark).

PUNKT 12: Miljøoplysninger

12.1. Toksicitet

Vurdering af aquatisk toksicitet:
Baseret på tilgængelige data er klassificeringskriterierne ikke opfyldt. Der er stor sandsynlighed for, at produktet er harmløst overfor aquatiske organismer.

12.2. Persistens og nedbrydelighed

Vurdering af bionedbrydelighed og eliminering (H2O):
Egentlig bionedbrydelig. Den uopløselige bestanddel kan, i egnede rensningsanlæg, elimineres gennem mekanisk separation.
Den polymere andel af produktet er dårlig biologisk nedbrydelig.

12.3. Bioakkumuleringspotentiale

Vurdering af bioakkumuleringpotentialet.:
Ingen eksisterende data.
Undgå udledning til miljøet.

12.4. Mobilitet i jord

Bedømmelse af transport mellem miljøområder:
Flygtighed: Ingen eksisterende data.

12.5. Resultater af PBT- og vPvB-vurdering

Produktet opfylder ikke kriterierne for PBT (persistent/bioakkumulerende/toksisk) og vPvB (meget persistent/meget bioakkumulerende).

12.6. Andre negative virkninger

Produktet indeholder ingen stoffer, der er listet i bilag I af Forordning (EF) Nr. 2037/2000 om stoffer, der nedbryder ozonlaget.

12.7. Supplerende oplysninger

Øvrige økotoksikologiske henvisninger:
Produktet må ikke ukontrolleret udledes til miljøet. Produktet er ikke blevet testet. De økotoksikologiske data er udledt af de enkelte komponenters egenskaber.

PUNKT 13: Forhold vedrørende bortskaffelse

13.1. Metoder til affaldsbehandling

Nationale og internationale regler og forskrifter skal observeres.
Rester skal bortskaffes som stoffet/produktet.

Forurenet emballage:
Forurenet emballage skal tømmes optimalt, og kan derefter genanvendes efter rensning.

PUNKT 14: Transportoplysninger

Landtransport

ADR

	Ikke farligt gods i forhold til transportforskrifterne
UN-nummer:	Ikke anvendelig.
UN-forsendelsesbetegnelse (UN proper shipping name):	Ikke anvendelig.
Transportfareklasse(r):	Ikke anvendelig.
Emballagegruppe:	Ikke anvendelig.
Miljøfarer:	Ikke anvendelig.
Særlige forsigtighedsregler for brugeren	Ingen bekendt.

RID

	Ikke farligt gods i forhold til transportforskrifterne
UN-nummer:	Ikke anvendelig.

UN-forsendelsesbetegnelse (UN proper shipping name):	Ikke anvendelig.
Transportfareklasse(r):	Ikke anvendelig.
Emballagegruppe:	Ikke anvendelig.
Miljøfarer:	Ikke anvendelig.
Særlige forsigtighedsregler for brugeren	Ingen bekendt.

Indenrigssøtransport

ADN

Ikke farligt gods i forhold til transportforskrifterne

UN-nummer:	Ikke anvendelig.
UN-forsendelsesbetegnelse (UN proper shipping name):	Ikke anvendelig.
Transportfareklasse(r):	Ikke anvendelig.
Emballagegruppe:	Ikke anvendelig.
Miljøfarer:	Ikke anvendelig.
Særlige forsigtighedsregler for brugeren	Ingen bekendt.
Transport i tankskib i indre vandveje:	Ikke vurderet

Søtransport

IMDG

Ikke farligt gods i forhold til transportforskrifterne

UN-nummer:	Ikke anvendelig.	UN number:	Not applicable
UN-forsendelsesbetegnelse (UN proper shipping name):	Ikke anvendelig.	UN proper shipping name:	Not applicable
Transportfareklasse(r):	Ikke anvendelig.	Transport hazard class(es):	Not applicable
Emballagegruppe:	Ikke anvendelig.	Packing group:	Not applicable
Miljøfarer:	Ikke anvendelig.	Environmental hazards:	Not applicable
Særlige forsigtighedsregler for brugeren	Ingen bekendt.	Special precautions for user	None known

Sea transport

IMDG

Lufttransport

IATA/ICAO

Ikke farligt gods i forhold til transportforskrifterne

UN-nummer:	Ikke anvendelig.	UN number:	Not applicable
UN-	Ikke anvendelig.	UN proper shipping	Not applicable

Air transport

IATA/ICAO

forsendelsesbetegnelse (UN proper shipping name):		name:	
Transportfareklasse(r):	Ikke anvendelig.	Transport hazard class(es):	Not applicable
Emballagegruppe:	Ikke anvendelig.	Packing group:	Not applicable
Miljøfarer:	Ikke anvendelig.	Environmental hazards:	Not applicable
Særlige forsigtighedsregler for brugeren	Ingen bekendt.	Special precautions for user	None known

14.1. UN-nummer
Se de modsvarende angivelser for "UN-nummer" i de respektive forskrifter i de ovenstående tabeller.

14.2. UN-forsendelsesbetegnelse (UN proper shipping name)
Se de modsvarende angivelser for "UN-forsendelsesbetegnelse" i de respektive forskrifter i de ovenstående tabeller.

14.3. Transportfareklasse(r)
Se de modsvarende angivelser for "Transportfareklasse(r)" i de respektive forskrifter i de ovenstående tabeller.

14.4. Emballagegruppe
Se de modsvarende angivelser for "Emballagegruppe" i de respektive forskrifter i de ovenstående tabeller.

14.5. Miljøfarer
Se de modsvarende angivelser for "Miljøfarer" i de respektive forskrifter i de ovenstående tabeller.

14.6. Særlige forsigtighedsregler for brugeren
Se de modsvarende angivelser for "Særlige forsigtighedsregler for brugeren" i de respektive forskrifter i de ovenstående tabeller.

14.7. Bulktransport i henhold til bilag II i MARPOL 73/78 og IBC-koden		**Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code**	
Forordning:	Ikke vurderet	Regulation:	Not evaluated
Transport tilladt:	Ikke vurderet	Shipment approved:	Not evaluated
forureningsnavn:	Ikke vurderet	Pollution name:	Not evaluated
Forureningskatagori:	Ikke vurderet	Pollution category:	Not evaluated
Skibstype:	Ikke vurderet	Ship Type:	Not evaluated

PUNKT 15: Oplysninger om regulering

15.1. Særlige bestemmelser/særlig lovgivning for stoffet eller blandingen med hensyn til sikkerhed, sundhed og miljø

Hvis yderligere lovgivning er gældende, der ikke allerede er anført andre steder i dette sikkerhedsdatablad, vil det være beskrevet i dette underpunkt.

MAL-kode (1993): 00-1

Unge under 18 år må som hovedregel ikke arbejde med dette produkt, jf. bekendtgørelsen om unges arbejde (Danmark).
Produktet er omfattet af Arbejdstilsynets Bekendtgørelse/vejledning om grænseværdier for stoffer og materialer (Danmark).

15.2. Kemikaliesikkerhedsvurdering

kemikaliesikkerhedsvurdering ikke krævet

PUNKT 16: Andre oplysninger

Den fulde ordlyd af klassificeringerne, herunder farebetegnelse, faresymboler, R-sætninger og faresætninger, hvis nævnt i sektion 2 eller 3:

Xn	Sundhedsskadelig.
N	Miljøfarlig.
22	Farlig ved indtagelse.
48/22	Farlig: alvorlig sundhedsfare ved længere tids påvirkning ved indtagelse.
52/53	Skadelig for organismer, der lever i vand; kan forårsage uønskede langtidsvirkninger i vandmiljøet.
51/53	Giftig for organismer, der lever i vand; kan forårsage uønskede langtidsvirkninger i vandmiljøet.
Acute Tox.	Akut toksicitet
STOT RE	Specifik målorganstoksicitet — gentagen eksponering
Aquatic Chronic	Farlig for vandmiljøet - kronisk
H302	Farlig ved indtagelse.
H373	Kan forårsage organskader (Nyre) ved længerevarende eller gentagen eksponering.
H412	Skadelig for vandlevende organismer, med langvarige virkninger.

Hvis De har spørgsmål til dette SDB, dets indhold eller andre produktsikkerhedsrelevante spørgsmål, bedes De skrive til følgende e-mailadresse: product-safety-north@basf.com

De oplysninger, som er i sikkerhedsdatabladet, er baseret på vores nuværende viden og erfaringer og beskriver produktet udelukkende med henblik på sikkerhedskrav. Oplysningerne beskriver ikke produktets egenskaber (produktspecifikation). En aftalt beskaffenhed eller egnethed af produktet til et bestemt anvendelsesområde kan ikke afledes af oplysningerne. Det påhviler modtageren af produktet at overholde ejendomsrettigheder samt eksisterende love og bestemmelser.

Fosroc® Preco XPozR

constructive solutions

Punkt 1. Identifikation af stoffet/blandingen og af selskabet/virksomheden

1.1 Produktindikator

Produktnavn: Preco XPozR
PR-nr.: 858307

1.2 Relevante identificerede anvendelser for stoffet eller blandingen samt anvendelser, der frårådes

Anvendelse: Vandbaseret frilægningsretarder til beton, primært positive overflader.

1.3 Nærmere oplysninger om leverandøren af sikkerhedsdatabladet

Leverandør: Fosroc A/S
Industriparken 27, Skodborg,
6630 Rødding
Tlf. 74 84 88 84

Ansvarlig for udarbejdelse af sikkerhedsdatabladet: SDS_info@dhigroup.com

1.4 Nødtelefon

Nødtelefon: 24-timers nødtelefon: Bispebjerg Hospitals giftlinje: 82 12 12 12.

Punkt 2. Fareidentifikation

2.1 Klassificering af stoffet eller blandingen

CLP: Produktet er ikke klassificeret.

2.2 Mærkningselementer

På basis af producentens oplysninger om den kemiske sammensætning er produktet ikke omfattet af reglerne om klassificering. Der er dog krav om, at produktet skal forsynes med følgende mærkning:
Sikkerhedsdatablad kan på anmodning rekvireres.

2.3 Andre farer

PBT/vPvB: Ikke relevant.
Andre: Kan medføre let øjenirritation. Langvarig hudkontakt kan medføre rødme, irritation og tør hud.

Punkt 3. Sammensætning af/oplysning om indholdsstoffer

3.2 Blandinger

Produktet indeholder: Vand og fyldstoffer.
CLP:

%	: 15-30
CAS-nr.	: 14807-96-6
EF-nr.	: 238-877-9
REACH reg.nr.	: -
Kemisk navn	: Talkum
Fareklassificering	: -
Anmærkninger	: Der er fastsat en grænseværdi for stoffet.

%	: 1-5
CAS-nr.	: 13463-67-7
EF-nr.	: 236-675-5
REACH reg.nr.	: -
Kemisk navn	: Titandioxid
Fareklassificering	: -
Anmærkninger	: Der er fastsat en grænseværdi for stoffet.

Punkt 4. Førstehjælpsforanstaltninger

4.1 Beskrivelse af førstehjælpsforanstaltninger

Indånding: Søg frisk luft og forbliv i ro.
Hudkontakt: Fjern forurenet tøj og skyl huden grundigt med vand.
Øjenkontakt: Skyl straks med rigeligt vand i op til 15 minutter. Fjern evt. kontaktlinser og spil øjet godt op. Ved fortsat irritation: Søg læge og medbring sikkerhedsdatabladet.
Indtagelse: Skyl straks munden og drik rigeligt vand. Hold personen under opsyn. Ved ubehag, søg skadestue og medbring sikkerhedsdatabladet.

4.2 Vigtigste symptomer og virkninger, både akutte og forsinkede

Symptomer/virkninger: Se punkt 11 for yderligere information om sundhedsfare og symptomer.

4.3 Angivelse af om øjeblikkelig lægehjælp og særlig behandling er nødvendig

Lægehjælp/behandling: Ikke kendt.

Punkt 5. Brandbekæmpelse

5.1 Slukningsmidler

Slukningsmidler: Brandslukningsmiddel vælges under hensyntagen til evt. andre kemikalier.

5.2 Særlige farer i forbindelse med stoffet eller blandingen

Særlige farer: Ved brand kan der dannes sundhedsfarlige gasser.

5.3 Anvisninger for brandmandskab

Beskyttelsesudstyr til slukningspersonel: Valg af åndedrætsværn ved brand: Følg virksomhedens generelle forholdsregler.

Punkt 6. Forholdsregler over for udslip ved uheld

6.1 Personlige sikkerhedsforanstaltninger, personlige værnemidler og nødprocedurer

Personlige sikkerhedsforanstaltninger: Undgå kontakt med øjnene og langvarig hudkontakt.

6.2 Miljøbeskyttelsesforanstaltninger

Miljøbeskyttelsesforanstaltninger: Undgå udledning til jord og vandmiljø.

6.3 Metoder og udstyr til inddæmning og oprensning

Metoder til oprydning: Mindre spild: Spild skrabes op eller opsuges med sugende materiale. Større spild: Inddæm og opsug spild med sand, savsmuld eller lignende.

6.4 Henvisninger til andre punkter

Vedrørende personlige værnemidler, se punkt 8.
Vedrørende bortskaffelse, se punkt 13.

Punkt 7. Håndtering og opbevaring

7.1 Forholdsregler for sikker håndtering

Håndtering: Undgå længerevarende og gentagen kontakt. Følg god kemikaliehygiejne.
Tekniske forholdsregler: Hold arbejdspladsen ren. Følg sikkerhedsforskrifterne i Arbejdstilsynets bekendtgørelse om arbejde med kodenummererede produkter.
Tekniske foranstaltninger: Mekanisk ventilation kan være påkrævet.

7.2 Betingelser for sikker opbevaring, herunder eventuel uforenelighed

Tekniske forholdsregler ved opbevaring: Ingen særlige krav.
Opbevaringsbetingelser: Opbevares i tætlukket originalemballage ved temperaturer mellem +5°C og +30°C.

7.3 Særlige anvendelser

Særlige anvendelser: Ikke relevant.

Punkt 8. Eksponeringskontrol/personlige værnemidler

Kodenr.: 0-1 (1993).

8.1 Kontrolparametre

Grænseværdier:

CAS-nr.	Kemisk navn:	Som:	Grænseværdier:	Type:	Anm.:	Ref.:
13463-67-7	Titandioxid	Ti	0.6mg/m³	-	-	AT
14807-96-6	Talkum indeholdende fibre	-	0.3 fiber/ml	-	K	AT

Anm.: K: Kræftfremkaldende.

8.2 Eksponeringskontrol

Tekniske foranstaltninger: Der skal være effektiv ventilation.
Personlige værnemidler: Personlige værnemidler skal vælges i overensstemmelse med gældende CEN standarder og i samarbejde med leverandøren af personlige værnemidler.
Åndedrætsværn: Ved utilstrækkelig ventilation: Ved sprøjtning: Brug åndedrætsværn med partikelfilter, type P2.
Håndbeskyttelse: Ved risiko for kontakt: Brug beskyttelseshandsker. Bedst egnede er nitrilhandsker, men væsken kan trænge gennem handskerne. Skift derfor hyppigt handsker.
Øjenbeskyttelse: Ved risiko for stænk: Beskyttelsesbriller/ansigtsskærm skal anvendes.
Hudbeskyttelse: Overtræksdragt skal anvendes, hvor der sker tilsmudsning i en sådan grad, at almindeligt arbejdstøj ikke beskytter mod hudkontakt med produktet. Ved sprøjtning: Brug hætte eller hjelm og beskyttelsesdragt.
Hygiejniske foranstaltninger: Vask hænder efter brug.
Miljøeksponeringskontrol: Ikke kendt.

Punkt 9. Fysiske-kemiske egenskaber

9.1 Oplysninger om grundlæggende fysiske og kemiske egenskaber

Udseende	: Farvet væske
Lugt	: Svag lugt
pH	: 6-8
Flammepunkt	: Ikke relevant
Eksplosionsgrænser	: Ikke relevant
Relativ massefylde	: 1.36
Opløselighed	: Brandbar med vand

9.2 Andre oplysninger

Andre oplysninger : Ikke kendt

Punkt 10. Stabilitet og reaktivitet

10.1 Reaktivitet

Reaktivitet: Ingen kendte.

10.2 Kemisk stabilitet

Stabilitet: Stabil ved de foreskrevne opbevaringsbetingelser.

10.3 Risiko for farlige reaktioner

Farlige reaktioner: Ingen kendte.

10.4 Forhold, der skal undgås

Tilstande/materialer, der skal undgås: Undgå frost.

10.5 Materialer, der skal undgås

Materialer, der skal undgås: Ingen kendte.

10.6 Farlige nedbrydningsprodukter

Farlige nedbrydningsprodukter: Ingen ved omgivelsestemperaturer.

Punkt 11. Toksikologiske oplysninger

11.1 Oplysninger om toksikologiske virkninger

Akut Toksicitet (Oral): Kriterierne for klassificering kan på grundlag af de foreliggende data ikke anses for at være opfyldt.
Akut Toksicitet (Dermal): Kriterierne for klassificering kan på grundlag af de foreliggende data ikke anses for at være opfyldt.
Akut Toksicitet (Inhalation): Kriterierne for klassificering kan på grundlag af de foreliggende data ikke anses for at være opfyldt.
Hudætsning/-irritation: Kriterierne for klassificering kan på grundlag af de foreliggende data ikke anses for at være opfyldt.
Alvorlig øjenskade/øjenirritation: Kan virke irriterende.
Sensibilisering ved indånding eller hudsensibilisering: Kriterierne for klassificering kan på grundlag af de foreliggende data ikke anses for at være opfyldt.
Kimcellemutagenicitet: Kriterierne for klassificering kan på grundlag af de foreliggende data ikke anses for at være opfyldt.
Kræftfremkaldende egenskaber: Kriterierne for klassificering kan på grundlag af de foreliggende data ikke anses for at være opfyldt.
Reproduktionstoksicitet: Kriterierne for klassificering kan på grundlag af de foreliggende data ikke anses for at være opfyldt.
STOT - Enkelt eksponering: Kriterierne for klassificering kan på grundlag af de foreliggende data ikke anses for at være opfyldt.
STOT - Gentagen eksponering: Kriterierne for klassificering kan på grundlag af de foreliggende data ikke anses for at være opfyldt.
Aspirationsfare: Kriterierne for klassificering kan på grundlag af de foreliggende data ikke anses for at være opfyldt.
Indånding: Aerosoler kan irritere luftvejene.
Hudkontakt: Langvarig kontakt kan medføre rødme, irritation og tør hud.
Øjenkontakt: Kan virke irriterende og fremkalde rødme og svie.
Indtagelse: Kan virke irriterende og medføre mavesmerter, opkastninger og diarré.
Særlige effekter: Ingen kendte.

Punkt 12. Miljøoplysninger

12.1 Toksicitet

Økotoksicitet: Produktet er blandbart med vand. Kan spredes i vandmiljøet.

12.2 Persistens og nedbrydelighed

Nedbrydelighed: Produktets nedbrydelighed er ikke oplyst.

12.3 Bioakkumuleringspotentiale

Bioakkumuleringspotentiale: Data om bioakkumulering er ikke oplyst.

12.4 Mobilitet i jord

Mobilitet: Ingen tilgængelige oplysninger.

12.5 Resultater af PBT- og vPvB-vurdering

PBT/vPvB: Ikke relevant.

12.6 Andre negative virkninger

Andre skadelige effekter: Produktets skadelige virkninger på miljøet anses for at være begrænsede.

Punkt 13. Forholdsregler vedrørende bortskaffelse

13.1 Metoder til affaldsbehandling

Spild og rester bortskaffes i overensstemmelse med kommunens affaldsregulativer.
Affald i form af rester:
EAK-kode : 08 01 12

Punkt 14. Transportoplysninger

Er ikke omfattet af de internationale regler om transport af farligt gods (IMDG, IATA, ADR/RID).

14.1 UN-nummer

UN-nr.: -

14.2 UN-forsendelsesbetegnelse (UN proper shipping name)

Officiel godsbetegnelse: -

14.3 Transportfareklasse(r)

Klasse: -

14.4 Emballagegruppe

PG: -

14.5 Miljøfarer

Marin forureningsfaktor: -
Miljøfarligt stof: -

14.6 Særlige forsigtighedsregler for brugeren

Særlige forsigtighedsregler: Ingen kendte.

14.7 Bulktransport i henhold til bilag II i MARPOL 73/78 og IBC-koden

Bulktransport: Ikke relevant.

Punkt 15. Oplysninger om regulering

15.1 Særlige bestemmelser/særlig lovgivning for stoffet eller blandingen med hensyn til sikkerhed, sundhed og miljø

Danske særregler:
Kodenr.: 0-1 (1993).
PR-nr.: 858307.
Nationale reguleringer: Europa-Parlamentets og Rådets forordning (EF) nr. 1272/2008 af 16. december 2008 om klassificering, mærkning og emballering af stoffer og blandinger og om ændring og ophævelse af direktiv 67/548/EØF og 1999/45/EF og om ændring af forordning (EF) nr. 1907/2006 med ændringer.
Miljøministeriets bekendtgørelse nr. 1075 af 24. november 2011 om klassificering, emballering, mærkning, salg og opbevaring af kemiske stoffer og produkter.
Arbejdstilsynets bekendtgørelse nr. 292 af 26. april 2001 om arbejde med stoffer og materialer (kemiske agenser), med ændringer.
Beskæftigelsesministeriets bekendtgørelse nr. 559 af 4. juli 2002 om særlige pligter for fremstillere, leverandører og importører mv. af stoffer og materialer efter lov om arbejdsmiljø med ændringer.
Arbejdstilsynets bekendtgørelse nr. 302 af 13. maj 1993 om arbejde med kodenummererede produkter, med ændringer.
Arbejdstilsynets bekendtgørelse nr. 507 af 17. maj 2011, med ændringer.
At-Vejledning C.0.1 August 2007: Grænseværdier for stoffer og materialer.
Miljøministeriets bekendtgørelse nr. 1309 af 18. december 2012 om affald, med ændringer.

15.2 Kemikaliesikkerhedsvurdering

CSA status: Der er ikke udført en kemikaliesikkerhedsvurdering.

Punkt 16. Andre oplysninger

Andre oplysninger: Brugeren skal være instrueret i arbejdets udførelse og kende indholdet af dette sikkerhedsdatablad.
Klassificering i henhold til Forordning (EF) nr. 1272/2008: Beregningsmetode.
Sikkerhedsdatabladet er udarbejdet af DHI - Centre for Environment and Toxicology - 2014-12-15.
Følgende punkter er blevet revideret eller indeholder nye oplysninger: 2, 3, 11, 15, 16.

Forbehold

Oplysningerne i dette sikkerhedsdatablad er baseret på oplysninger i DHI's besiddelse på datoen for udarbejdelsen og er givet under forudsætninger af, at produktet anvendes under de angivne forhold og i overensstemmelse med anvendelsesmåden specificeret på emballagen eller i relevant teknisk litteratur. Enhver anden brug af produktet, evt. i kombination med andre produkter eller processer, sker på brugerens eget ansvar.

Fosroc A/S
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fosroc.dk@fosroc.com

SIKKERHEDSDATABLAD

HAUCON®

Q8 da Vinci 8

Q8 Oils

PUNKT 1: Identifikation af stoffet/blandingen og af selskabet/virksomheden

1.1 Produktidentifikator

Produktnavn : Q8 da Vinci 8

Materiale anvendelser : Betonformolie

1.2 Relevante identificerede anvendelser for stoffet eller blandingen samt anvendelser, der frarådes

Ikke relevant.

1.3 Nærmere oplysninger om leverandøren af sikkerhedsdatabladet

Producent / Distributør : Q8 Danmark A/S
Arne Jacobsens Allé 7
2300 København S
Danmark
Tel. 7012 4545, Fax 4599 2020

E-mail adresse på person ansvarlig for dette SDS : SDSinfo@Q8.com, communication preferably in English only.

1.4 Nødtelefon

Europa : +44 (0) 1235 239 670

Global (English only) : +44 (0) 1865 407 333

CARECHEM24

PUNKT 2: Fareidentifikation

2.1 Klassificering af stoffet eller blandingen

Produktdefinition : Blanding

Klassificering i henhold til Europa-Parlamentets og Rådets forordning (EF) nr. 1272/2008 [CLP/GHS]

Dette produkt er klassificeret som farligt i henhold til forordning (EF) 1272/2008 med ændringer.

Asp. Tox. 1, H304

Ingredienser med ukendt toksicitet : Ingen.

Ingredienser med ukendt økotoksicitet : Ingen.

Klassificering ifølge Direktiv 1999/45/EF [DPD]

Produktet er ikke klassificeret som farligt i henhold til Direktivet 1999/45/EF og det's senere tilpasninger.

Klassificering : Ikke klassificeret.

Se den komplette tekst for R-sætninger eller H-faresætninger nævnt ovenfor i punkt 16.

Se afsnit 11 for mere detaljerede oplysninger om helbredspåvirkninger og symptomer.

2.2 Mærkningselementer

Farepiktogrammer :

Signalord : Farlig

Faresætninger : H304 - Kan være livsfarligt, hvis det indtages og kommer i luftvejene.

Sikkerhedssætninger

PUNKT 2: Fareidentifikation

Generelt : Ikke relevant.

Forebyggelse : Ikke relevant.

Reaktion : P301 + P310 + P331 - I TILFÆLDE AF INDTAGELSE: Ring omgående til en GIFTINFORMATION eller en læge. Fremkald IKKE opkastning.

Opbevaring : P405 - Opbevares under lås.

Bortskaffelse : P501 - Indholdet/beholderen bortskaffes i henhold til alle lokale, regionale, nationale og internationale regulativer.

Farlige indholdsstoffer : destillater (råolie), solventafvoksede lette paraffin-

Supplementerende etiket elementer : Ikke relevant.

Særlige krav til pakning/emballage

Beholdere, som skal være forsynet med børnesikre lukninger : Ikke relevant.

Følbar advarselstrekant : Ikke relevant.

2.3 Andre farer

Stoffet opfylder kriterierne for PBT i henhold til Regulativ (EF) nr. 1907/2006, bilag XIII : Ikke relevant.

Stoffet opfylder kriterierne for vPvB i henhold til Regulativ (EF) nr. 1907/2006, bilag XIII : Ikke relevant.

Andre farer, som ikke indebærer klassificering : Virker affedtende på huden. Vedvarende eller gentagende kontakt kan udtørre huden og forårsage irritation.

PUNKT 3: Sammensætning af/oplysning om indholdsstoffer

3.2 Blandinger : Blanding

Produkt/ingrediens navn	Identifikatorer	%	Klassificering 67/548/EØF	Klassificering Forordning (EF) nr. 1272/2008 [CLP]	Type
destillater (råolie), solventafvoksede lette paraffin-	REACH #: 01-2119480132-48 EF: 265-159-2 CAS: 64742-56-9 Indeks: 649-469-00-9	≥50 - <75	Ikke klassificeret.	Asp. Tox. 1, H304	[1] [2]
Hydrocarbons, C15-C20, n-alkanes, isoalkanes, cyclics, <0.03% aromatics	REACH #: 01-2119827000-58 EF: 934-956-3	≥25 - <50	Xn; R65 **Den komplette tekst for de ovenfor nævnte R-sætninger vises i sektion 16.**	Asp. Tox. 1, H304 **Se den komplette tekst for H-faresætninger nævnt ovenfor i punkt 16.**	[1] [2]

De mineralske olier i produktet indeholder < 3 % DMSO-ekstrakt (IP 346).

Der er ingen supplerende indholdsstoffer tilstede, som efter leverandørens nuværende kendskab og i anvendte koncentrationer, er klassificeret som sundhedsskadelige eller miljøfarlige, er PBT'er, vPvB'er eller tilsvarende problematiske stoffer, eller som er blevet tildelt en grænseværdi for arbejdspladsen og som derfor behøver nævnes i denne sektion.

PUNKT 3: Sammensætning af/oplysning om indholdsstoffer

Type

[1] Stoffet er klassificeret med en sundheds- eller miljøfare
[2] Stoffet har en af Arbejdstilsynet fastsat grænseværdi
[3] Stoffet opfylder kriterierne for PBT i henhold til Regulativ (EF) nr. 1907/2006, bilag XIII
[4] Stoffet opfylder kriterierne for vPvB i henhold til Regulativ (EF) nr. 1907/2006, bilag XIII
[5] Tilsvarende problematisk stof

Grænseværdier er nævnt under afsnit 8, hvis de er tilgængelige.

PUNKT 4: Førstehjælpsforanstaltninger

4.1 Beskrivelse af førstehjælpsforanstaltninger

Øjenkontakt : Skyl straks øjne med store mængder vand, hvor øverste og nederste øjenlåg lejlighedsvis løftes. Kontroller for og fjern evt. kontaktlinser. Bliv ved med at skylle i mindst 10 minutter. Søg lægebehandling.

Indånding : Flyt personen til et sted med frisk luft og sørg for, at vedkommende hviler i en stilling, som letter vejrtrækningen. Hvis der ingen vejrtrækning er, hvis vejrtrækningen er uregelmæssig eller hvis åndedrættet ophører, så sørg for kunstigt åndedræt eller ilt fra uddannet personale. Det kan være farligt for den person, der giver hjælp, at yde mund-til-mund genoplivning. Søg læge hvis der er alvorlige eller vedvarende skadevirkninger for sundheden. Er personen bevidstløs, lægges personen i NATO-stilling og der søges straks lægebehjælp. Oprethold åbne luftveje. Løsn stram beklædning som f.eks. krave, slips, bælte eller bukse-/nederdelslinning.

Hudkontakt : Vask huden grundigt med vand og sæbe eller anvend velegnet hudrensemiddel. Forurenet tøj og sko tages af. Sørg for lægehjælp, hvis der opstår symptomer. Vask beklædning, før det genbruges. Rengør skoene grundigt, før de bruges igen.

Indtagelse : Søg straks lægebehandling. Kontakt en giftinformationscentral eller læge. Skyl munden med vand. Fjern eventuel tandprotese. Flyt personen til et sted med frisk luft og sørg for, at vedkommende hviler i en stilling, som letter vejrtrækningen. Hvis materialet er indtaget, og den tilskadekomne er ved bevidsthed, gives små mægder vand at drikke. Stop, hvis den tilskadekomne bliver dårlig, da opkastning kan være farlig. Aspirationfare ved indtagelse. Kan trænge ned i lungerne og medføre skade. Fremkald ikke opkastning. Hvis opkastning indtræffer, holdes hovedet lavt så der ikke kommer opkast i lungerne. Giv aldrig en bevidstløs person noget gennem munden. Er personen bevidstløs, lægges personen i NATO-stilling og der søges straks lægebehjælp. Oprethold åbne luftveje. Løsn stram beklædning som f.eks. krave, slips, bælte eller bukse-/nederdelslinning.

Beskyttelse af førstehjælpere : Der må ikke iværksættes handling, der medfører personlig risiko, eller uden passende uddannelse. Det kan være farligt for den person, der giver hjælp, at yde mund-til-mund genoplivning.

4.2 Vigtigste symptomer og virkninger, både akutte og forsinkede

Potentielle akutte helbredspåvirkninger

Øjenkontakt : Ingen kendte betydelige virkninger eller kritiske risici.

Indånding : Ingen kendte betydelige virkninger eller kritiske risici.

Hudkontakt : Virker affedtende på huden. Kan forårsage tørhed og irritation af huden.

Indtagelse : Kan være livsfarligt, hvis det indtages og kommer i luftvejene.

Tegn/symptomer på overeksponering

Øjenkontakt : Ingen specifikke data.

Indånding : Ingen specifikke data.

Hudkontakt : Alvorlige symptomer kan omfatte følgende:
irritation
tørhed
revner

Indtagelse : Alvorlige symptomer kan omfatte følgende:
kvalme eller opkastning

4.3 Angivelse af om øjeblikkelig lægehjælp og særlig behandling er nødvendig

PUNKT 4: Førstehjælpsforanstaltninger

Anmærkninger til lægen. : Der bør behandles symptomatisk. Kontakt straks læge eller skadestue, hvis store mængder er blevet indtaget eller inhaleret.

Særlige behandlinger : Ingen specifik behandling.

PUNKT 5: Brandbekæmpelse

5.1 Slukningsmidler

Egnede slukningsmidler : Brug pulver (tør kemikalie), CO_2, alkohol-resistent-skum eller vandspray (vandtåge).

Uegnede slukningsmidler : Brug ikke vandstråle.

5.2 Særlige farer i forbindelse med stoffet eller blandingen

Risici ved stof eller blanding : Trykket stiger i tilfælde af brand eller ved opvarmning, og beholderen kan briste.

Farlige nedbrydningsprodukter ved opvarmning : Nedbrydningsprodukter kan omfatte de følgende materialer:
kuldioxid
kulmonoxid
svovloxider

5.3 Anvisninger for brandmandskab

Specielle beskyttelsesforanstaltninger for brandslukningspersonale : Hvis der er ildebrand, så isoler straks området ved at fjerne alle personer i nærheden af branden. Der må ikke iværksættes handling, der medfører personlig risiko, eller uden passende uddannelse.

Særlige personlige værnemidler, som skal bæres af brandmandskabet : Brandmænd bør bære passende beskyttelsesudstyr og selvforsynet, lufttilført åndedrætsapparatur (SCBA) med fuld ansigtsmaske, som skal anvendes i positiv tryktilstand. Beklædning for brandfolk (inklusive hjelme, beskyttelsesstøvler og handsker) i henhold til den europæiske standard EN 469 vil yde et grundlæggende beskyttelsesniveau ved kemikalie uheld.

PUNKT 6: Forholdsregler over for udslip ved uheld

6.1 Personlige sikkerhedsforanstaltninger, personlige værnemidler og nødprocedurer

For ikke-indsatspersonel : Der må ikke iværksættes handling, der medfører personlig risiko, eller uden passende uddannelse. Evakuer de omkringværende områder. Sørg for at unødvendige og ubeskyttede personer ikke kan komme ind. Rør ikke ved, eller gå ikke igennem det spildte materiale. Undgå indånding af dampe eller spraytåger. Sørg for tilstrækkelig ventilation. Brug egnet åndedrætsværn ved utilstrækkelig ventilationen. Anvend egnet, personligt beskyttelsesudstyr.

For indsatspersonel : Hvis særlig beklædning er påkrævet for at håndtere spildet, skal man være opmærksom på alle oplysninger i punkt 8 om passende og upassende materialer. Se også informationen under "For ikke-akut personale".

6.2 Miljøbeskyttelsesforanstaltninger : Undgå spredning af spildt materiale og afstrømning og kontakt med jord, vandveje, afløb og kloakker. Underret myndighederne hvis produktet har medført miljøforurening (kloakker, vandveje, jord og luft).

6.3 Metoder og udstyr til inddæmning og oprensning

Lille udslip : Stop utætheden, hvis det kan gøres uden risiko. Flyt beholdere væk fra spildområdet. Fortynd med vand og mop op hvis vandopløselig. Alternativt, eller hvis uopløsligt i vand, absorber med et ikke brændbart tørstof og placer i en egnet affaldsbeholder. Bortskaffes via en godkendt affaldsordning.

PUNKT 6: Forholdsregler over for udslip ved uheld

Stort udslip : Stop utætheden, hvis det kan gøres uden risiko. Flyt beholdere væk fra spildområdet. Gå udslippet imøde i medvind. Undgå udslip til kloakker, vandløb, kældre eller lukkede områder. Vask spild ned i et anlæg til behandling af udstrømmende spild eller gør følgende. Spild begrænses og opsamles med ikke-brandbart absorberende materiale, f.eks. sand, jord, vemiculite, diatomejord og placeres i beholder og bortskaffes i overensstemmelse med gældende regler. Bortskaffes via en godkendt affaldsordning. Forurenet opsugningsmateriale kan have samme farlige egenskaber som det spildte produkt.

6.4 Henvisning til andre punkter : Se Afsnit 1 for kontaktoplysninger i nødsituationer.
Se punkt 8 for oplysninger om egnet, personligt beskyttelsesudstyr.
Se Afsnit 13 for yderligere oplysninger om affaldshåndtering.

PUNKT 7: Håndtering og opbevaring

Oplysningerne i dette punkt indeholder generelle råd og vejledning. Listen over identificerede anvendelser i punkt 1 bør konsulteres for at få enhver oplysning relateret til specifik brug ved eksponeringsscenarier.

7.1 Forholdsregler for sikker håndtering

Beskyttelsesforanstaltninger : Brug egnede personlige værnemidler (se sektion 8). Må ikke synkes. Undgå kontakt med øjne, hud og beklædning. Undgå indånding af dampe eller spraytåger. Opbevares i den originale beholder eller godkendt alternativ, der er fremstillet af et tilsvarende materiale, hold den tæt lukket, når den ikke bruges. Tomme beholdere fastholder produktrester og kan derfor være farlige. Genbrug ikke beholderen.

Råd om generel bedriftsmæssig hygiejne : Rygning, indtagelse af mad og drikke er ikke tilladt i områder, hvor dette produkt håndteres, oplagres og forarbejdes. Brugere skal vaske hænder og ansigt, før de spiser, drikker eller ryger. Fjern tilsmudset tøj og beskyttelsesudstyr, før der gås ind på arealer til spisning. Se også punkt 8 for yderligere oplysninger om hygiejneforanstaltninger.

7.2 Betingelser for sikker opbevaring, herunder eventuel uforenelighed

Opbevares i henhold til lokale regler. Opbevares i original emballage, beskyttet fra direkte sollys på et tørt, køligt og vel-ventileret sted, væk fra uforenelige materialer (se Punkt 10) samt føde- og drikkevarer. Opbevares under lås. Hold beholderen tæt lukket og forseglet, indtil den skal bruges. Åbnede beholdere skal lukkes omhyggeligt og opbevares oprejst for at forebygge lækage. Må ikke opbevares i umærkede beholdere. Skal indesluttes forsvarligt for at undgå miljøforurening.

7.3 Særlige anvendelser

Anbefalinger : Ikke tilgængelig.

Specifikke løsninger til den industrielle sektor : Ikke tilgængelig.

PUNKT 8: Eksponeringskontrol/personlige værnemidler

Oplysningerne i dette punkt indeholder generelle råd og vejledning. Information gives baseret på typiske forventede anvendelser af produktet. Der kan være behov for yderligere foranstaltninger ved bulkhåndtering eller andre anvendelser, der kan øge arbejdstagereksponeringen eller frigivelser til miljøet.

8.1 Kontrolparametre

Arbejdstilsynets grænseværdier

Produkt/ingrediens navn	Grænseværdier for eksponering
destillater (råolie), solventafvoksede lette paraffin- Hydrocarbons, C15-C20, n-alkanes, isoalkanes, cyclics, <0.03% aromatics	**Arbejdstilsynet (Danmark, 5/2011).** Gennemsnitværdier: 1 mg/m³ 8 timer. Form: tåge, partikler **EU OEL (Europa).** TWA: 5 mg/m³

PUNKT 8: Eksponeringskontrol/personlige værnemidler

Anbefalede målingsprocedurer : Hvis dette produkt indeholder ingredienser med eksponeringsgrænser, kan det være nødvendigt at foretage personlig og biologisk overvågning samt overvågning af atmosfæren på arbejdspladsen for at kontrollere effektiviteten af ventilationen og andre kontrolforanstaltninger og/eller nødvendigheden for at anvende åndedrætsværn. Der bør henvises til overvågningsstandarder, såsom følgende: Europæisk Standard EN 689 (Luftundersøgelse. Arbejdspladsluft. Vejledning i vurdering af eksponering ved inhalation af kemiske stoffer i forhold til grænseværdier og målestrategi) Europæisk Standard EN 14042 (Arbejdspladsluft - Vejledning i anvendelse og brug af fremgangsmåder til vurdering af eksponering for kemiske og biologiske stoffer) Europæisk Standard EN 482 (Arbejdspladsluft - Generelle krav til ydeevne ved procedurer til måling af kemiske midler) Reference til nationale vejledningsdokumenter for metoder til fastsættelse af farlige stoffer vil også være påkrævet.

DNEL'er/DMEL'er

Ingen tilgængelige DNEL'er/DMEL'er.

PNEC'er

Ingen tilgængelige PNEC'er.

8.2 Eksponeringskontrol

Egnede foranstaltninger til eksponeringskontrol : God generel ventilation skulle være tilstrækkeligt til at kontrollere arbejdernes udsættelse for luftbårne urenheder.

Individuelle beskyttelsesforanstaltninger

Hygiejniske foranstaltninger : Vask hænder, underarme og ansigt grundigt efter håndtering af kemiske produkter, før der spises, ryges eller benyttes toilet, og ved arbejdsperiodens afslutning. De rette teknikker bør bruges til at fjerne beklædning, der muligvis er forurenet. Vask forurenet tøj, før det atter tages i brug. Sørg for, at øjenvaskestationer og nødbruser befinder sig tæt på arbejdsstationens beliggenhed.

Beskyttelse af øjne/ansigt : Der bør anvendes beskyttelsesbriller, som overholder en godkendt standard, når en risikovurdering angiver, at det er nødvendigt for at undgå udsættelse for væskesprøjt, spraytåger, gasser eller støv. Ved mulighed for kontakt skal følgende beskyttelse bæres, medmindre vurderingen angiver en højere beskyttelsesgrad: beskyttelsesbriller med sideskjold.

Beskyttelse af hud

Beskyttelse af hænder : Når kemiske produkter håndteres, bør der på alle tidspunkter anvendes kemikalieresistente, uigennemtrængelige handsker, som overholder en godkendt standard, hvis en risikovurdering angiver, at det er nødvendigt. Kontroller under brugen, at handskernes beskyttende egenskaber stadig er bevaret, under hensyntagen til de af handskeproducenten angivne parametre. Det skal bemærkes, at gennembrydningstiden for et givet handskemateriale kan være forskellig for forskellige handskeproducenter. I tilfælde af blandinger bestående af flere stoffer kan handskernes beskyttelsestid ikke estimeres nøjagtigt. Anvend passende handsker testet i henhold til EN374. Anbefalet: Nitrilhandsker.

Beskyttelse af krop : Personligt beskyttelsesudstyr til kroppen bør vælges på grundlag af den opgave, der skal udføres, og de involverede risici og bør godkendes af en specialist, før dette produkt håndteres.

Anden hudbeskyttelse : Passende fodtøj og alle yderligere hudbeskyttelsesforanstaltninger bør vælges baseret på opgaven, som skal udføres og de involverede risici, og bør godkendes af en specialist før håndtering af dette produkt.

Åndedrætsværn : Brug en korrekt tilpasset luftrensende eller luftforsynet gasmaske, som overholder en godkendt standard, hvis en risikovurdering angiver, at det er nødvendigt. Valg af respirator skal være baseret på kendte eller forventede eksponeringsniveauer, faren ved produktet og sikre funktionsgrænser for den valgte respirator. Anbefalet: Kogepunkt > 65 °C: A1; Kogepunkt < 65 °C: AX1; Varmt materiale: A1P2.

Foranstaltninger til begrænsning af eksponering af miljøet : Emissioner fra udluftnings- eller arbejdsudstyr bør kontrolleres for at sikre, at de opfylder de juridiske krav for miljøbeskyttelse. I visse tilfælde vil det være nødvendigt med luftrensere, filtre eller andre tekniske modifikationer til udstyret for at reducere emissionerne til acceptable niveauer.

PUNKT 9: Fysisk-kemiske egenskaber

9.1 Oplysninger om grundlæggende fysiske og kemiske egenskaber

Udseende

Fysisk tilstandsform	:	Væske. [Olieagtig væske.]
Udseende	:	Klar.
Farve	:	Gul [Lys]
Lugt	:	Svag / svagt
Lugttærskel	:	Ikke tilgængelig.
pH-værdi	:	5.1
Smeltepunkt/frysepunkt	:	-15°C
Begyndelseskogepunkt og kogepunktsinterval	:	>260°C
Flammepunkt	:	Åben beholder: >136°C [ASTM D92.]
Fordampningshastighed	:	Ikke tilgængelig.
Antændelighed (fast stof, luftart)	:	Ikke relevant.
Øvre/nedre antændelses- eller eksplosionsgrænser	:	Ikke tilgængelig.
Damptryk	:	<0.01 kPa [rumtemperatur]
Dampmassefylde	:	Ikke tilgængelig.
Relativ massefylde	:	0.845
Opløselighed	:	Uopløselig i de følgende materialer: koldt vand og varmt vand.
Fordelingskoefficient: n-oktanol/vand	:	Ikke tilgængelig.
Selvantændelsestemperatur	:	>300°C
Dekomponeringstemperatur	:	>300°C
Viskositet (40°C)	:	8 cSt
Eksplosive egenskaber	:	Ikke relevant.
Oxiderende egenskaber	:	Ikke relevant.

9.2 Andre oplysninger

Ingen yderligere oplysninger.

PUNKT 10: Stabilitet og reaktivitet

10.1 Reaktivitet	:	Ingen specifikke testdata relateret til reaktivitet er tilgængelige for dette produkt eller dets indholdsstoffer.
10.2 Kemisk stabilitet	:	Produktet er stabilt.
10.3 Risiko for farlige reaktioner	:	Under normale opbevarings- og anvendelsesforhold opstår der ingen farlige reaktioner.
10.4 Forhold, der skal undgås	:	Ingen specifikke data.
10.5 Materialer, der skal undgås	:	Reaktiv eller inkompatibel med følgende materialer: Stærkt oxiderende materialer
10.6 Farlige nedbrydningsprodukter	:	Ved normale opbevarings- og brugsforhold bør der ikke dannes farlige nedbrydningsprodukter.

PUNKT 11: Toksikologiske oplysninger

11.1 Oplysninger om toksikologiske virkninger

Akut toksicitet

Produkt/ingrediens navn	Resultat	Arter	Dosis	Eksponering
destillater (råolie), solventafvoksede lette paraffin-	LC50 Indånding Støv og spraytåger	Rotte - Mand, Kvinde	5.53 mg/l	4 timer
	LD50 Dermal	Kanin	>5000 mg/kg	-
	LD50 Oral	Rotte	>5000 mg/kg	-
Hydrocarbons, C15-C20, n-alkanes, isoalkanes, cyclics, <0.03% aromatics	LC50 Indånding Støv og spraytåger	Rotte	>5266 mg/m³	4 timer
	LD50 Oral	Rotte	>5000 mg/kg	-

Konklusion/Sammendrag : Ikke tilgængelig.

Estimater for akut toksicitet

Ikke tilgængelig.

Irritation/ætsning

Produkt/ingrediens navn	Resultat	Arter	Score	Eksponering	Observation
destillater (råolie), solventafvoksede lette paraffin-	Hud - Erythema/skorpe	Kanin	0.17	72 timer	7 dage
	Hud - Ødem	Kanin	0	72 timer	7 dage
	Øjne - Iris læsion	Kanin	0	48 timer	72 timer
	Øjne - Rødmen i conjunctivae	Kanin	0.33	48 timer	72 timer

Konklusion/Sammendrag : Ikke tilgængelig.

Overfølsomhed

Produkt/ingrediens navn	Eksponeringsmetode	Arter	Resultat
destillater (råolie), solventafvoksede lette paraffin-	hud	Marsvin	Ikke sensibiliserende

Konklusion/Sammendrag : Ikke tilgængelig.

Mutagenicitet

Produkt/ingrediens navn	Test	Eksperiment	Resultat
destillater (råolie), solventafvoksede lette paraffin-	474 Mammalian Erythrocyte Micronucleus Test	Eksperiment: In vivo Emne: Pattedyr - dyr Celle: Somatisk	Negativ

Konklusion/Sammendrag : Ikke tilgængelig.

Kræftfremkaldende egenskaber

Produkt/ingrediens navn	Resultat	Arter	Dosis	Eksponering
destillater (råolie), solventafvoksede lette paraffin-	Negativ - Dermal - TC	Mus - Kvinde	-	78 uger

Konklusion/Sammendrag : Ikke tilgængelig.

Reproduktionstoksicitet

Produkt/ingrediens navn	Modertoksicitet	Frugtbarhed	Udviklingsgift	Arter	Dosis	Eksponering
destillater (råolie), solventafvoksede lette paraffin-	Negativ	Negativ	Negativ	Rotte - Mand, Kvinde	Oral: 1000 mg/kg	-

Konklusion/Sammendrag : Ikke tilgængelig.

PUNKT 11: Toksikologiske oplysninger

Teratogenicitet

Produkt/ingrediens navn	Resultat	Arter	Dosis	Eksponering
destillater (råolie), solventafvoksede lette paraffin-	Negativ - Dermal	Rotte	2000 mg/kg	7 dage pr. uge

Konklusion/Sammendrag : Ikke tilgængelig.

Enkel STOT-eksponering

Ikke tilgængelig.

Gentagne STOT-eksponeringer

Ikke tilgængelig.

Aspirationsfare

Produkt/ingrediens navn	Resultat
destillater (råolie), solventafvoksede lette paraffin- Hydrocarbons, C15-C20, n-alkanes, isoalkanes, cyclics, <0.03% aromatics	ASPIRATIONSFARE - Kategori 1 ASPIRATIONSFARE - Kategori 1

Oplysninger om sandsynlige eksponeringsveje : Ikke tilgængelig.

Potentielle akutte helbredspåvirkninger

Øjenkontakt : Ingen kendte betydelige virkninger eller kritiske risici.

Indånding : Ingen kendte betydelige virkninger eller kritiske risici.

Hudkontakt : Virker affedtende på huden. Kan forårsage tørhed og irritation af huden.

Indtagelse : Kan være livsfarligt, hvis det indtages og kommer i luftvejene.

Symptomer forbundet med fysiske, kemiske og toksikologiske egenskaber

Øjenkontakt : Ingen specifikke data.

Indånding : Ingen specifikke data.

Hudkontakt : Alvorlige symptomer kan omfatte følgende:
irritation
tørhed
revner

Indtagelse : Alvorlige symptomer kan omfatte følgende:
kvalme eller opkastning

Forsinkede og øjeblikkelige virkninger samt kroniske virkninger ved kortvarig og længerevarende eksponering

Eksponering i kort tid

Potentielle øjeblikkelige effekter : Ikke tilgængelig.

Potentielle forsinkede effekter : Ikke tilgængelig.

Eksponering i lang tid

Potentielle øjeblikkelige effekter : Ikke tilgængelig.

Potentielle forsinkede effekter : Ikke tilgængelig.

Potentielle kroniske sundhedseffekter

PUNKT 11: Toksikologiske oplysninger

Produkt/ingrediens navn	Resultat	Arter	Dosis	Eksponering
destillater (råolie), solventafvoksede lette paraffin-	Sub-kronisk NOAEL Oral	Rotte - Mand, Kvinde	≥2000 mg/kg	13 uger; 5 dage pr. uge
	Sub-akut LOAEL Oral	Rotte - Mand	125 mg/kg	13 uger; 5 timer pr. dag
	Sub-akut NOAEL Indånding Støv og spraytåger	Rotte - Mand	>980 mg/m³	4 uger; 5 dage pr. uge

Konklusion/Sammendrag : Ikke tilgængelig.

Generelt : Vedvarende eller gentagende kontakt kan affedte huden og medføre irritation, revner og/eller dermatitis.

Kræftfremkaldende egenskaber : Ingen kendte betydelige virkninger eller kritiske risici.

Mutagenicitet : Ingen kendte betydelige virkninger eller kritiske risici.

Teratogenicitet : Ingen kendte betydelige virkninger eller kritiske risici.

Udviklingseffekter : Ingen kendte betydelige virkninger eller kritiske risici.

Fertilitets effekter : Ingen kendte betydelige virkninger eller kritiske risici.

Andre oplysninger : Ikke tilgængelig.

PUNKT 12: Miljøoplysninger

12.1 Toksicitet

Produkt/ingrediens navn	Resultat	Arter	Eksponering
Hydrocarbons, C15-C20, n-alkanes, isoalkanes, cyclics, <0.03% aromatics	Akut EC50 >10000 mg/l	Alger	72 timer
	Akut EC50 >3193 mg/l	Dafnie	48 timer
	Akut EC50 >1028 mg/l	Fisk	96 timer

Konklusion/Sammendrag : Ikke tilgængelig.

12.2 Persistens og nedbrydelighed

Produkt/ingrediens navn	Test	Resultat	Dosis	Podestof
Hydrocarbons, C15-C20, n-alkanes, isoalkanes, cyclics, <0.03% aromatics	OECD 306	74 % - let - 28 dage	-	-

Konklusion/Sammendrag : Ikke tilgængelig.

Produkt/ingrediens navn	Halveringstid i vand	Fotolyse	Bionedbrydelighed
destillater (råolie), solventafvoksede lette paraffin-	-	-	Iboende
Hydrocarbons, C15-C20, n-alkanes, isoalkanes, cyclics, <0.03% aromatics	-	-	let

12.3 Bioakkumuleringspotentiale

Produkt/ingrediens navn	$LogP_{ow}$	BCF	mulighed
destillater (råolie), solventafvoksede lette paraffin-	>3	-	lav

12.4 Mobilitet i jord

PUNKT 12: Miljøoplysninger

Fordelingskoefficient for jord/vand (K_{OC}) : Ikke tilgængelig.

Mobilitet : Ikke tilgængelig.

12.5 Resultater af PBT- og vPvB-vurdering

PBT : Ikke relevant.

vPvB : Ikke relevant.

12.6 Andre negative virkninger : Ingen kendte betydelige virkninger eller kritiske risici.

PUNKT 13: Forhold vedrørende bortskaffelse

Oplysningerne i dette punkt indeholder generelle råd og vejledning. Listen over identificerede anvendelser i punkt 1 bør konsulteres for at få enhver oplysning relateret til specifik brug ved eksponeringsscenarier.

13.1 Metoder til affaldsbehandling

Produkt

Metoder for bortskaffelse : Produktion af affald bør undgås eller minimeres hvor som helst, det er muligt. Bortskaffelse af dette produkt, opløsninger og eventuelle biprodukter bør til enhver tid overholde kravene i lovgivningen om miljøbeskyttelse og bortskaffelse af affald og alle regionale og lokale myndigheders eventuelle krav. Overskudsprodukter og produkter der ikke kan genbruges bortskaffes via en godkendt affaldsordning. Ubehandlet affald må ikke smides i kloakken med mindre det er fuldstændig i overensstemmelse med alle kompetente myndighedskrav.

Farligt Affald : Ja.

Europæisk affaldskatalog (EWC)

Affaldskode	Affaldsbetegnelse
13 02 05*	Mineralske, ikke-chlorerede motor-, gear- og smøreolier

Emballage

Metoder for bortskaffelse : Produktion af affald bør undgås eller minimeres hvor som helst, det er muligt. Affaldsemballage bør genbruges. Forbrænding eller deponering på losseplads bør kun overvejes, hvis genvinding ikke er muligt.

Særlige forholdsregler : Materialet og dets beholder skal bortskaffes på en sikker måde. Der skal udvises omhu ved håndtering af tomme beholdere, som ikke er blevet rengjorte eller skyllede af. Tomme beholdere eller den indvendige beklædning kan indeholde rester fra produktet. Undgå spredning af spildt materiale og afstrømning og kontakt med jord, vandveje, afløb og kloakker.

PUNKT 14: Transportoplysninger

	ADR/RID	ADN	IMDG	IATA
14.1 UN-nummer	Ikke reguleret.	Ikke reguleret.	Not regulated.	Not regulated.
14.2 UN-forsendelsesbetegnelse (UN proper shipping name)	-	-	-	-
14.3 Transportfareklasse (r)	-	-	-	-
14.4 Emballagegruppe	-	-	-	-

PUNKT 14: Transportoplysninger

14.5 Miljøfarer	Nej.	Nej.	No.	No.
Yderligere oplysninger	-	-	-	-

14.6 Særlige forsigtighedsregler for brugeren : **Transport indenfor fabriksområdet:** Transporter altid i lukkede, opretstående og sikrede beholdere. Personer, der transporterer produktet skal have kendskab til forholdsregler ved spild og uheld.

14.7 Bulktransport i henhold til bilag II til MARPOL 73/78 og IBC-koden : Ikke tilgængelig.

PUNKT 15: Oplysninger om regulering

15.1 Særlige bestemmelser/særlig lovgivning for stoffet eller blandingen med hensyn til sikkerhed, sundhed og miljø

EU regulativ (EF) Nr. 1907/2006 (REACH)

Bilag XIV - Fortegnelse over stoffer, der kræver godkendelse

Bilag XIV

Ingen af bestanddelene er angivet.

Særligt problematiske stoffer

Ingen af bestanddelene er angivet.

Andre EU regler

Europa's register : Ikke bestemt.

Seveso II Direktiv

Dette produkt er ikke kontrolleret under Seveso II-direktivet.

Nationale regler

Produktregistreringsnummer : PR-nr: 2334507

Mal-kode (1993) : 00-1

Beskyttelse baseret på MAL-kode : **Ifølge bekendtgørelsen om arbejde med kodenummererede produkter gælder følgende bestemmelser for brug af personlige værnemidler:**

Generelt: Ved alt arbejde som kan indebære tilsmudsning skal handsker anvendes. Forklæde/overtræksdragt/beskyttelsedragt skal anvendes hvor der sker tilsmudsning i en sådan grad, at almindeligt arbejdstøj ikke beskytter effektivt mod hudkontakt med produktet. Hvis helmaske ikke anbefales skal ansigtsskærm anvendes ved stænkende arbejde. Eventuelt anvist øjenbeskyttelse bortfalder i såfald.

Ved al sprøjtearbejde, hvor der er returspray (tilbageslag), skal der anvendes åndedrætsværn og ærmebeskyttere/forklæde/overtræksdragt/beskyttelsedragt som anbefalet eller instrueret.

Mal-kode (1993): 00-1
Anvendelse: Ved sprøjtning i eksisterende* sprøjtebokse hvis operatøren er udenfor sprøjtezonen.

- Ærmebeskyttere skal anvendes.

Ved al sprøjtning med aerosoldannelse i kabine eller sprøjteboks, hvor operatøren er i sprøjtezonen og ved sprøjtning udenfor lukkede anlæg, kabine eller boks.

PUNKT 15: Oplysninger om regulering

- Der skal anvendes helmaske med kombineret filter, overtræksdragt og hætte.

Tørring: Elementer til tørring/tørreovne, som midlertidigt er placeret f. eks. i en reolvogn, skal være forsynet med mekanisk udsugning, så dampe fra de våde emner ikke passerer arbejderes indåndingszone.

Polering: Ved polering af behandlede overflader skal støvfiltermaske anvendes. Ved maskinslibning skal der anvendes beskyttelsesbriller. Arbejdshandsker skal altid anvendes.

Forsigtig Reglerne indeholder andre bestemmelser udover de ovennævnte.

*Se regulativer.

Anvendelsesbegrænsninger : Må ikke anvendes erhvervsmæssigt af unge under 18 år, jævnfør Arbejdsministeriets bekendtgørelse om unges farlige arbejde.

Fareklasse for vand (WGK) : 1 Bilag nr. 4

Internationale regelsæt

Liste over Kemiske våbenbestemmelser, del I, II og III Kemikalier

Ikke på listen.

Montreal protokollen (Bilag A, B, C, E)

Ikke på listen.

Stockholmkonventionen om persistente organiske miljøgifte (POP)

Ikke på listen.

Rotterdam-konventionen om forudgående informeret samtykke (PIC)

Ikke på listen.

UN ECE Aarhus Protokol for POP'er og tungmetaller

Ikke på listen.

Internationale lister

National opgørelse

Australien : Ikke bestemt.

Canada : Alle bestanddele er enten angivne eller undtagede.

Kina : Alle bestanddele er enten angivne eller undtagede.

Japan : Ikke bestemt.

Malaysia : Ikke bestemt.

New Zealand : Ikke bestemt.

Filippinerne : Ikke bestemt.

Republikken Korea : Ikke bestemt.

Taiwan : Ikke bestemt.

USA : Alle bestanddele er enten angivne eller undtagede.

15.2 Kemikaliesikkerhedsvurdering : Produktet indeholder stoffer, som der fortsat kræves en kemisk sikkerhedsvurdering af.

PUNKT 16: Andre oplysninger

Angiver oplysninger, der er ændret fra den tidligere udgave.

Forkortelser og initialord : ATE = Vurdering af Akut Toksicitet
CLP = Lovgivning om Klassificering, Mærkning og Emballering af stoffer og blandinger [Europa-Parlamentets og Rådets Forordning (EF) Nr. 1272/2008]
DMEL-værdi = Derived-Minimal-Effect-Level
DNEL-værdi = Derived-No-Effect-Level
EUH sætning = CLP-specificeret faresætning
PBT = Persistent, Bioakkumulerende og Toksisk
PNEC-værdi = Predicted-No-Effect-Concentration
RRN = REACH Registreringsnummer
vPvB = Meget Persistente og Meget Bioakkumulerende

Procedure brugt til at opnå klassificeringen i henhold til Forordning (EF) nr. 1272/2008 [CLP/GHS]

Klassificering	Begrundelse
Asp. Tox. 1, H304	Kalkulationsmetode

Komplet tekst af forkortede H-sætninger : H304 Kan være livsfarligt, hvis det indtages og kommer i luftvejene.

Fulde tekst af klassificeringer [CLP/GHS] : Asp. Tox. 1, H304 ASPIRATIONSFARE - Kategori 1

Komplet tekst af forkortede R-sætninger : R65- Farlig: kan give lungeskade ved indtagelse.

Komplet tekst af klassificeringer [DSD/DPD] : Xn - Sundhedsskadelig

Udskrivningsdato : 9-01-2015

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Dato for forrige udgave : 1-11-2013

Version: : 1.02

Udarbejdet af : Kuwait Petroleum Research & Technology B.V., The Netherlands

Bemærkning til læseren

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FOREWORD INTRODUCTION

TEXANOL
CAS N°: 25265-77-4

Substance

End Point	:	**IDENTIFIERS, PHYSICAL AND CHEMICAL PROPERTIES**
Chemical Name	:	**Propanoic acid, 2-methyl-, monoester with 2,2,4-trimethyl-1,3-pentanediol**
Common Name	:	**Texanol**
CAS Number	:	**25265-77-4**

Synonyms

Chissocizer CS 12
CS 12
Isobutyraldehyde tishchenko trimer
Isobutyric acid, ester with 2,2,4-trimethyl-1,3-pentanediol
Texanol ester alcohol
2,2,4-Trimethyl-1,3-pentanediol monoisobutyrate

Properties & Definitions

Molecular Formula	:	**C12H24O3**
Molecular Weight	:	**216.32**
Melting Point	:	**-50C**
Boiling Point	:	**244C**
State	:	**Liquid**
Flash Point	:	**120C (o-cup)**
Flamable Limit	:	**0.62% at 149C - 4.24% at 201C**
Density	:	**0.95 at 20C**
Vapour Pressure	:	**0.013 mbar (0.010 mmHg) at 20C**
Octanol/Water Partition Coefficient	:	**log Pow = 3.47 at 25C experimental**
Water Solubility	:	**858 mg/L at 18-22C ***
Colour	:	**Colourless**
Odour	:	**Mild**
Additives	:	**No additive typically present.**
Impurities	:	**2,2,4-Trimethyl pentane-1,3-diol 0.1% (CAS RN: 144-19-4); TXBI (texanol isobutyrate) 0.6% (CAS RN = 6846-50-0); NPGDI 0.1%; TMPI : trace; 3-isobutyroxy-2,2,4-trimethyl pentanol: trace; 3-oxo-2,2,4-trimethyl penten-1-ol: trace; keto ester: trace.**
General Comments	:	VP = 0.017 mbar (0.013 mmHg) at 25C is also reported.*In distilled water; 519 mg/L in diluent water at 18-22C. Vapor density : 7.45 (air=1); auto ignition temperature 393C. Material is unlikely to accumulate a static charge which could act as an ignition source. Stable; can react with strong oxidizing agents. Polymerizaiton will not occur.

Overall Evaluation

EXPOSURE

ENVIRONMENTAL EXPOSURE

Based on its physiochemical properties, the test material will not be a persistent environmental contaminant. With the exception of an unlikely spill situation (99% of the material is handled in closed tanks and drums; formulation of latex paints, which accounts for 84% of the total use and over 97% use of the non-intermediate use of the material is conducted in closed equipment), the only environmental exposure will be via the air during the drying of paint. The low vapor pressure (0.013 mbar at 20C) and high boiling point (244C) of the material would preclude high localized airborne concentrations of the test material. Estimated atmospheric residence time for the test material is 403 hours, which predicts ultimate degradation of the test material in air.

CONSUMER EXPOSURE

The primary exposure to this substance is during its end use in latex paint, during application and subsequent drying of the paint. In order to characterize worker and consumer exposure to this material, a study was

conducted in which airborne concentrations of the substance were measured in a study conducted to characterize worker and consumer exposure to volatile components during field application and subsequent drying of water based polyvinyl acetate paints. Paints were applied using airless spraying of roller/brush methods in rooms having either 0.5 or 5.0 air changes per hour. For each scenario, a personal breathing zone air sample was collected during application, and fixed station air samples were collected during application and 6 hours, 24 hours, and one week after application. The maximal concentration of the substance from breathing zone samples was 0.99 ppm (during spraying applications) with a room air exchange rate of 5 air changes per hour. At an exchange rate of 0.5 air changes per hour, the maximum concentration measured from fixed stations during roller applications was 1.96 ppm. Overall average concentrations measured in rooms with an exchange rate of 5.0 air changes per hour was only 0.44 ppm. The average concentration during spray application in a room with 0.5 air changes per hour was 0.67 ppm, and the corresponding average for roller applications was 0.37 ppm. Six hours after application, concentrations of the chemical were below the 0.33 ppm average environmental limit of detection in the rooms with an air exchange rate of 5.0 air exchanges per hour. At 24 hours, levels were below the limit level of detection of 0.19 ppm in 19 of 24 rooms (combined rooms having either 0.5 or 5.0 air changes per hour). Only one of four samples collected at 7 days contained the chemical at a concentration above the 0.01 ppm limit of detection.

OCCUPATIONAL EXPOSURE

In manufacture, dry, acid-free isobutyraldehyde is self-condensed in the presence of trace sodium isobutoxide catalyst in an enclosed, continuous manufacturing system. The product mixture is water-washed to remove the sodium salts, and then passes through distillation columns to remove the product from other substances also formed from the chemical reaction. The refined product typically assay 99.0% or higher. The process water is treated to remove essentially all remaining traces of product. The manufacturing process has various vents which release insignificant amounts of the product because of its low volatility. There are two process waste streams containing small amount of the product. These streams are incinerated.

During manufacture, fifteen one-liter samples are taken each day (347 days per year) for analysis. Thirty minutes are required to take and analyze each sample. This operation is rotated among 40 different workers per year. Some dermal exposure is possible (from spilling), but it would be slight and infrequent. During equipment maintenance, the equipment is drained free of material. Mechanics wear protective goggles and impermeable gloves; thus, dermal exposure is negligible. Some inhalation exposure may occur during drumming and loading tank cars (15 minute operations), but inhalation exposure is not appreciable, since the substance has a low vapor pressure and good ventilation is provided to the work area. Industrial hygiene monitoring of the work area indicates that the 8-hour time-weighed average air concentration of the substance is typically less than 0.5 ppm.

During processing to make plasticizer, the substance is normally stored in tanks and transported through closed lines to continuous reactors for chemical conversion. A small number of workers could be exposed for a few minutes when taking small quality control samples prior to chemical conversion. The low vapor pressure of the material minimizes the level of exposure during sampling.

Minimal exposure occurs routinely during handling of the material, since it is primarily (99%) stored in closed tanks and in closed drums. Transport is predominantly in tank cars and tank trucks.

ASSESSMENT AND CONCLUSIONS

The potential occupational exposure is low because the substance is manufactured and processed in closed continuous equipment. Inhalation exposure is further limited by the low vapor pressure of the substance. Dermal exposure could occure infrequently by accident or during quality control sampling; however, it is the practice to wear impermeable gloves and other protective clothing at points of potential exposure.

Consumer exposure is likely, since the predominant use of this substance is as a coalescing aid at up to 3% concentration in latex paints. Although the number of consumers potentially exposed is high, the level of exposure is low (average room concentration of 0.37 ppm during roller application of latex paint in a room with 0.5 room air changes per hour) during the few days per year the average consumer spends painting.

Environmental exposure occurs primarily through volatilization of the substance from drying latex paint. Terrestrial and aquatic exposure would occur rarely through spills. The substance is predicted to undergo photodecomposition slowly in the atmosphere, and does not persist elsewhere in the environment, because it biodegrades at a modest rate.

The results of the SIDS testing indicate that the substance has a relatively low order of toxicity. Because of this low level of toxicity, low level of human exposure, and lack of persistence in the environment, it is recommended that a low priority be assigned to this substance for further testing.

Production-Trade

Chemical Name : **Texanol**
CAS Number : **25265-77-4**
Geographic Area : **USA**

Production

Quantity	*Year*
44359 t - P	**1989**
25000-50000 t/y - P	

General Comments : 25000 - 50000 tonnes/year (1977 TSCA Inventory).

References

!SIDSP*
OECD/SIDS. Screening Information Data Set (SIDS) of OECD High Production Volume Chemicals Programme, (1994)

Processes

Chemical Name : **Texanol**

CAS Number : **25265-77-4**

Process

Process comments : In manufacture, dry, acid-free isobutyraldehyde is self-condensed in the presence of trace sodium isobutoxide catalyst in an enclosed, continuous manufacturing system. The product mixture is water-washed to remove the product from other substances also formed from the chemical reaction. The refined product typically assays 99.0% or higher. The process water is treated to remove essentially all remaining traces of product. The manufacturing process has various vents which release insignificant amounts of the product because of its volatility.

References

Secondary Reference : **!SIDSP***

OECD/SIDS. Screening Information Data Set (SIDS) of OECD High Production Volume Chemicals Programme, (1994)

Uses

Chemical Name : **Texanol**
CAS Number : **25265-77-4**
Geographic Area : **USA**

Use

Quantity	*Year*	*Comments*
84 %		Approximately 84% of the material is used as a coalescing aid in latex paints where it is present at about a 3% concentration.
14 %		Approximately 14% of the material is used as a chemical intermediate which is converted to other chemical substances used as plasticizers.
2 %		About 2% of the material may be used to make dyestuffs, adhesives, building material agents, detergents, cleaning agents, fertilizers, surface treatment agents, or as a solvent.

References

Secondary References : **!SIDSP***
OECD/SIDS. Screening Information Data Set (SIDS) of OECD High Production Volume Chemicals Programme, (1994)

Study

End Point : **Pathway into the Environment and Environmental Fate.**
Chemical Name : **Texanol**
CAS Number : **25265-77-4**
Geographic Area : **USA**

Pathway and Transport

Pathway : **INDST**
Pathway description : Manufacturing

Quantity Transported

Medium	*to Medium*	*Quantity*	*Time*	*Year*	*to Year*
	to AIR	**3-4 t/y**			

Estimated annual release during manufacture at Eastman Chemical Company, almost entirely to air.

	to AIR	**25 t/y**			

Release reported in the past, but is based on a calculation method used by the State of Texas that overstimates fugitive emissions. Fugitive emissions will be determined again in 1993.

General Comments : Environmental release during customer processing is also estimated to be low due to low vapour pressure and processing in closed equipment. Actual environmental release data for customers who process the test material are not available. Since 84% of this material is used as a coalescing aid for latex paints, and is expected to evaporate during enduse, this atmospheric release will be the major environmental release for this product. It is not expected that this release will be concentrated in any particular geographic area or any specific timeframe, and environmental concentrations in any locality are expected to be negligible.

References

Secondary Reference : **!SIDSP***

OECD/SIDS. Screening Information Data Set (SIDS) of OECD High Production Volume Chemicals Programme, (1994)

Study

End Point	:	**CONCENTRATION**
Chemical Name	:	**Texanol**
CAS Number	:	**25265-77-4**
Geographic Area	:	**USA**

Test Subject

Organism	*Medium*	*Specification*	*Lifestage*	*Sex*
HUMAN	**AIR**	**OCC**	**ADULT**	

Test Method and Conditions

Test method description : Estimation of exposure, National Paint and Coatings Association Study

Test Results

Matrix	*Concentrations*	*Spec.*	*Date*

0.99 ppm

The maximal concentraion of this material from breathing zone samples (during applications) with a room air exchange rate of 5 air changes per hour.

1.96 ppm

The maximum concentration measured from fixed stations during roller applications, at an exchange rate of 0.5 air changes per hour.

0.44 ppm

Overall average concentrations measured in rooms with an exchange rate of 5.0 air changes per hour.

0.67 ppm

The average concentration during spray application in a room with 0.5 air changes per hour.

0.37 ppm

The averge concentration during roller applications in a room with 0.5 air changes per hour.

<0.33 ppm

Six hours after application, test chemical concentrations were below the 0.33 ppm average environmental limit of detection in the rooms with an air exchange rate of 5.0 air exchanges per hour.

<0.19 ppm

At 24 hours, levels were below the limit level of detection of 0.19 ppm in 19 of 24 rooms.

>0.01-0.01 ppm

Only one of four samples collected at 7 days contained the test amterial at a concentration above the 0.01 ppm limit of detection.

General Comments : Airborne concentrations of texanol were measured in a study conducted to characterize workers and consumer exposure to volatile components during field application and subsequent drying of water based polyvinyl acetate paints. Paints were applied using airless spraying or roller/brush methods in rooms having either 0.5 or 5.0 air changes per hour. For each scenario, a personal breathing zone air sample was collected during application, and fixed station air samples were collected during application and 6 hours, 24 hours, and one week after application.

References

Primary Reference : **ITCEV***
Kominsky, J. R. and Freyberg, R. W. International Technology Corporation Exposure to Volatile Compounds of Polivinyl Acetate (PVA) Emulsion Paints During Application and Drying : Report, (1992)

Secondary Reference : **!SIDSP***
OECD/SIDS. Screening Information Data Set (SIDS) of OECD High Production Volume Chemicals Programme, (1994)

Study

End Point : **CONCENTRATION**
Chemical Name : **Texanol**
CAS Number : **25265-77-4**
Study type : **LAB**
Geographic Area : **USA**

Test Subject

Organism	*Medium*	*Specification*	*Lifestage*	*Sex*
HUMAN	**AIR**	**OCC**		

Species/strain/system : Work area

Test Method and Conditions

Test method description : Monitoring study

Test Results

Matrix	*Concentrations*	*Spec.*	*Date*
AIR	**<0.5 ppm**		

Industrial hygiene monitoring of the work area indicates that the 8-hour time-weighed average air concentration of the substance is typically less than 0.5 ppm.

References

Secondary Reference : **!SIDSP***
OECD/SIDS. Screening Information Data Set (SIDS) of OECD High Production Volume Chemicals Programme, (1994)

Study

End Point	:	**HUMAN INTAKE AND EXPOSURE**
Chemical Name	:	**Texanol**
CAS Number	:	**25265-77-4**
Geographic Area	:	**USA**

Test Subject

Organism	*Medium*	*Specification*	*Route*	*Lifestage*	*Sex*
	AIR	**OCC**	**IHL**	**ADULT**	

Test Method and Conditions

Test method description	:	A quantitative potential inhalation dose may be derived using the equation (see comments) from a 1991 letter and an accompanying document entitled "Screening Level Exposure Assessments" from E. F. Bryan, USEPA to OECD Directorate.

Test Results

General Comments	:	PDR = Conc x IH x Dur x Freq, in which: PDR = Active inhalation potential dose rate (mg/year); Conc = Average air concentration (mg/m3); IH = Inhalation rate: 1.3 m3/hour, cited in above document; Dur = Duration of exposure (hour/day) ; and Freq = Frequency of expsure (days/year). For a commercial painter working 8 hours/day, 235 days/year, applying latex paint containing 3% of the test chemical in a room with 0.5 air changes per hour using the spray method (average concentration 0.67 ppm or 5.92 mg/m3), an annual worst-case dose may also be calculated.

References

Secondary Reference	:	**!SIDSP*** OECD/SIDS. Screening Information Data Set (SIDS) of OECD High Production Volume Chemicals Programme, (1994)

Study

End Point	:	**HUMAN INTAKE AND EXPOSURE**
Chemical Name	:	**Texanol**
CAS Number	:	**25265-77-4**
Geographic Area	:	**USA**

Test Subject

Organism	*Medium*	*Specification*	*Route*	*Lifestage*	*Sex*
	AIR	**OCC**	**IHL**	**ADULT**	

Test Results

General Comments : During processing to make plasticizer, the substance is normally stored in tanks and transported through closed lines to continuous reactors for chemical conversion. A small number of workers could be exposed for a few minutes when taking small quality control samples prior to chemical conversion. The low vapour pressure of the material minimizes the level of exposure during sampling. Minimal exposure occurs during handling of the material, since it is primarily (99 %) stored in closed tanks and in closed drums. Transport is predominantly in tank cars and tank trunks. The primary exposure to this substance is during its end use in latex paint, during application and subsequent drying of the paint. It is recommended that exposure assessment for this chemical be centered on this exposure point.

References

Secondary Reference : **!SIDSP***
OECD/SIDS. Screening Information Data Set (SIDS) of OECD High Production Volume Chemicals Programme, (1994)

Study

End Point : **HUMAN INTAKE AND EXPOSURE**
Chemical Name : **Texanol**
CAS Number : **25265-77-4**
Geographic Area : **USA**

Test Subject

Organism	*Medium*	*Specification*	*Route*	*Lifestage*	*Sex*
-			**SKN**	**ADULT**	
AIR			**IHL**		

Test Results

General Comments : During manufacture, fifteen one-liter samples are taken each day (347 days per year) for analysis. Thirty minutes are required to take and analyze each sample. This operation is rotated among 40 different workers per year. Some dermal exposure is possible (from spilling), but it would be slight and infrequent. During equipment maintenance, the equipment is drained free of material. Mechanics wear protective goggles and impermeable gloves; thus, dermal exposure is negligible. Some inhalation exposure may occur during drumming and loading tank cars (15 minutes operations) , but inhalation exposure is not appreciable, since the substance has a low vapour pressure and good ventilation is provided to the work area.

References

Secondary Reference : **!SIDSP***
OECD/SIDS. Screening Information Data Set (SIDS) of OECD High Production Volume Chemicals Programme, (1994)

Study

End Point	:	**BIODEGRADATION**
Chemical Name	:	**Texanol**
CAS Number	:	**25265-77-4**
Study type	:	**LAB**
Geographic Area	:	**USA**

Test Subject

Organism	*Medium*	*Specification*
	AQ	**SLUDG**

Species/strain/system : Sludge from secondary effluent derived from a commercial waste treatment plant.

Test Substance

Purity Grade : **99%**

Test Method and Conditions

Test method description : OECD Guideline 301 E (EEC/Annex V, Test C.3); GLP: yes

(An)aerobic : **AEROB**

Test Results

Quantity	*Time*	*Comments on result*
10 %	**9 d**	Degradation on day 9
33 %	**19 d**	Degradation (by extrapolation) on day 19
70 %	**34 d**	Degradation on day 34
90 %	**42 d**	Degradation on day 42, when the test was terminated

General Comments : The data indicate that 33% of the material degrades in the 10-day time window in which 70% degradation must occur in order for the chemical to be classified as readily biodegradable. 70% biodegradation did not occur until day 34. The results of this test indicate, however, that the test material is unlikely to persist in the environment, but may not be fully removed during wastewater treatment.

References

Primary Reference : **#URKOD***
Waston, H. M. Eastman Kodak Company Reports, ES-91-020, (1991)

Secondary Reference : **!SIDSP***
OECD/SIDS. Screening Information Data Set (SIDS) of OECD High Production Volume Chemicals Programme, (1994)

Study

End Point	:	**BIODEGRADATION**
Chemical Name	:	**Texanol**
CAS Number	:	**25265-77-4**
Study type	:	**LAB**
Geographic Area	:	**USA**

Test Subject

Organism	*Medium*	*Specification*
MCR	**AQ**	**SLUDG**

Species/strain/system : Acclimated sludge; secondary aeration basins of the Eastman Kodak Company Waste Water Treatment Plant in Rochester, New York.

Test Substance

Purity Grade : **99%**

Test Method and Conditions

Test method description : Eastman Kodak Company, Health and Environment Laboratories Protocol; GLP: yes

(An)aerobic : **AEROB**

Exposure

Exposure Period : **21 d**

Exposure comments : A 21-day biodegradation test was conducted utilizing two sources of acclimated sludge microorganisms. Acclimated organisms were used as the source of inoculum for biodegradation testing. (See general comments).

Test Results

Quantity	*Time*	*Comments on result*
57 %	**11 d**	The extent of degradation of the test material, measured by carbon dioxide evolution, using microorganisms acclimated for 11 days in a single acclimation flask without the transfer of microorganisms.
19 %		The extent of degradation using the transfer flask procedure

General Comments : In one procedure, microorganisms were acclimated over a 21-day period by making a series of adaptive transfers to increasing concentrations of the test chemical through a series of nine acclimation flasks. In the second procedure, microorganisms were acclimated for 11 days in a single acclimation flask without transfer of organisms. Based on the results of this test, the material is classified as moderately biodegradable. All material would utimately be biodegraded.

References

Primary Reference : **#URKOD***
Waston, H. M. Eastman Kodak Company Reports, ES-85-011, (1986)

Secondary Reference : **!SIDSP***
OECD/SIDS. Screening Information Data Set (SIDS) of OECD High Production Volume Chemicals Programme, (1994)

Study

End Point	:	**PHOTODEGRADATION**
Chemical Name	:	**Texanol**
CAS Number	:	**25265-77-4**
Study type	:	**FIELD**
Medium	:	**AIR**
Geographic Area	:	**USA**

Test Results

Quantity	*Time*	*Comments on result*
50 %	**400 h**	Approximate photodegradation half-life.

General Comments : The end use of approximately 84% of the substance is a coalescing agent at up to 3% in latex paints. The substance enters the atmosphere during application and drying of paint through evaporation, is dispersed and undergoes photodegradation.

References

Secondary Reference : **!SIDSP***
OECD/SIDS. Screening Information Data Set (SIDS) of OECD High Production Volume Chemicals Programme, (1994)

Study

End Point	:	**PHOTODEGRADATION**
Chemical Name	:	**Texanol**
CAS Number	:	**25265-77-4**
Medium	:	**AIR**
Geographic Area	:	**USA**

Test Method and Conditions

Test method description : Estimation method: Handbook of Chemical Property Estimation Methods

Test Results

General Comments : Texanol does not absorb wavelengths of light above 290 nm and thus will not be susceptible to direct (uncatalyzed) photodegradation. The reaction of this material with hydroxide radical (OH.) will be the only significant process by which this material would be removed from the atmospheric environment. The following estimate can be made for the atmospheric residence time: T(OH.) = 1 / K(OH.)(OH.) K(OH.) = 2.3E+12 cm3.mole-1.sec-1 (value for 2,2,4-trimethylpentane) and (OH.) = 3E-19 mole.cm3 (conservative value for Northern Hemisphere) Thus, T(OH.) = 1 / (2.3E+12)(3E-19) seconds or 403 hours.

References

Primary Reference : **HBCPM***

Lyman, W. J. et al. Handbook of Chemical Property Estimation Methods, Chapter 10, (1982)

Secondary Reference : **!SIDSP***

OECD/SIDS. Screening Information Data Set (SIDS) of OECD High Production Volume Chemicals Programme, (1994)

Study

End Point	:	**HYDROLYSIS**
Chemical Name	:	**Texanol**
CAS Number	:	**25265-77-4**
Study type	:	**LAB**
Medium	:	**AQ**
Geographic Area	:	**USA**

Test Substance

Purity Grade	:	**99%**

Test Method and Conditions

Test method description	:	OECD Guideline 111 (EEC/Annex. V, Test C.10); GLP: yes. Data obtained from the tests, were analyzed using Arrhenius relationship to calculate rate constants and half-lives.
Temperature	:	**25 c**
pH	:	**9**

Exposure

Dose / Concentration	:	The hydrolysis of both isomers was determined. Based on the results of the preliminary test, further testing was conducted at pH 9. The data from tests conducted at 50C, pH 9 provided hydrolysis profiles which (see general comments).

Test Results

Quantity	*Time*	*Comments on result*
50 %	**396 h**	Calculated half-life for one of the isomers at 25C and pH 9
50 %	**103 h**	Calculated half-life for the second isomer at 25C and pH 9

General Comments	:	Closely resembled first-order kinetics.

References

Primary Reference	:	**#URKOD*** Roser, K. S. Eastman Kodak Company Reports, 3VC3P43, (1992)
Secondary Reference	:	**!SIDSP*** OECD/SIDS. Screening Information Data Set (SIDS) of OECD High Production Volume Chemicals Programme, (1994)

Study

End Point	:	**BIOCONCENTRATION**
Chemical Name	:	**Texanol**
CAS Number	:	**25265-77-4**
Geographic Area	:	**USA**

Test Results

General Comments	:	Bioaccumulation data is not required because the substance biodegrades moderately rapid.

References

Secondary Reference	:	**!SIDSP*** OECD/SIDS. Screening Information Data Set (SIDS) of OECD High Production Volume Chemicals Programme, (1994)

Study

[redacted]

End Point : **MAMMALIAN ACUTE TOXICITY**
Chemical Name : **Texanol**
CAS Number : **25265-77-4**

Species/strain/system : Sprague-Dawley rats
Frequency : **1 x**
Dose / Concentration : **3200 mg/kg BW**

Test Method and Conditions

Test method description : Eastman Kodak Company Health and Environment Laboratories Protocol similar to OECD Guideline 401; GLP: yes. Purity: 99%

Test Results

Organism	*Medium*	*Spec.*	*Route*	*Lifestage*	*Sex*	*Effect*	*Effect Comments*
RAT			**ORL**		**M F**	**LD50**	Oral LD50 for rats was refered as >3200 mg/kg body weight.

General Comments : Fasted animals (4/dose) were administered the neat material by gavage at doses of 1600 mg/kg and 3200 mg/kg. Slight transient weakness between one and four hours after dosing with 3200 mg/kg was the only clinical abnormality observed. There was no mortality. Prior studies in which limited numbers of rats were administered the test chemical either neat on as a 10% solution in corn oil yielded approximate LD50 values of 3200-6400 or 1600-3200 mg/kg.

References

Primary Reference : **#URKOD***
O'Donoghue, J. L. Eastman Kodak Company Reports, TX-84-35, (1984)

Secondary Reference : **!SIDSP***
OECD/SIDS. Screening Information Data Set (SIDS) of OECD High Production Volume Chemicals Programme, (1994)

Study

[redacted]

End Point : **MAMMALIAN ACUTE TOXICITY**
Chemical Name : **Texanol**
CAS Number : **25265-77-4**

Species/strain/system : Carworth-Wistar rats
Frequency : **1 x**
Dose / Concentration : **6.86 mg/kg BW**

Test Method and Conditions

Test method description : Mellon Institute Protocol; GLP: no (Test predates GLP).

Test Results

Organism	*Medium*	*Spec.*	*Route*	*Lifestage*	*Sex*	*Effect*	*Effect Comments*
RAT			**ORL**			**LD50**	The single oral LD50 for rats was determined to be 6.86 mL/kg (6517 mg/kg). The 95% confidence interval was 4.64 - 10.1 mL/kg (4410 - 9595 mg/kg).

References

Primary Reference : **TXAPA9**
Carpenter, C. P. et al. Toxicology and Applied Pharmacology, 28, 313-319, (1974)

Secondary Reference : **!SIDSP***
OECD/SIDS. Screening Information Data Set (SIDS) of OECD High Production Volume Chemicals Programme, (1994)

Study

End Point : **MAMMALIAN ACUTE TOXICITY**
Chemical Name : **Texanol**
CAS Number : **25265-77-4**

Species/strain/system : Strain not identified
Frequency : **1 x**
Dose / Concentration : **1600-3200 mg/kg BW**

Test Method and Conditions

Test method description : Eastman Kodak Company Laboratory of Industrial Medicine Protocol; GLP: no (Test predates GLP).

Test Results

Organism	*Medium*	*Spec.*	*Route*	*Lifestage*	*Sex*	*Effect*	*Effect Comments*
MOUSE			**ORL**		**M**	**LD50**	Oral LD50 for male mice was determined as 1600 - 3200 mg/kg.

General Comments : The test was administered in corn oil to male mice (2/dose) at doses from 200 to 3200 mg/kg. Abnormal clinical signs observed were: weakness, rough haircoat, prostration, vasodilatation and labored respiration, primary at the highest dose. Both animals administered by the highest dose of 3200 died. All other animals survived and gained weight.

References

Primary Reference : **#URKOD***
Eastman Kodak Company Reports, (1960)

Secondary Reference : **!SIDSP***
OECD/SIDS. Screening Information Data Set (SIDS) of OECD High Production Volume Chemicals Programme, (1994)

Study

End Point : **MAMMALIAN ACUTE TOXICITY**
Chemical Name : **Texanol**
CAS Number : **25265-77-4**

Species/strain/system : Strain not identified
Dose / Concentration : **3550 mg/m3 AIR**

Test Method and Conditions

Test method description : Animals were exposed for 6 hours to an atmosphere generated by passing air (3.5 L/minute) through the test material heated to 100C. Eastman Kodak Company Laboratory of Industrial Medicine Protocol; GLP: no

Test Results

Organism	*Medium*	*Spec.*	*Route*	*Lifestage*	*Sex*	*Effect*	*Effect Comments*
RAT			**IHL**			**LC50**	Inhalation LC50 for rats was reported as >= 3.55 mg/L/6 h (highest concentration tested).

General Comments : Two groups of animals (3 rats/group) were exposed to nominal concentrations of either 2.73 or 3.55 mg/L. There were no abnormal clinical signs or mortality observed.

References

Primary Reference : **#URKOD***
Eastman Kodak Company Reports, (1960)

Secondary Reference : **!SIDSP***
OECD/SIDS. Screening Information Data Set (SIDS) of OECD High Production Volume Chemicals Programme, (1994)

Study

End Point : **MAMMALIAN ACUTE TOXICITY**
Chemical Name : **Texanol**
CAS Number : **25265-77-4**

Species/strain/system : Hartley guinea pigs
Exposure Period : **24 h**
Dose / Concentration : **20 mL/kg BW**

Test Method and Conditions

Test method description : Eastman Kodak Company Health and Environment Laboratories Protocol; GLP: yes. The test chemical was applied at doses of 5 mL/kg (one animal), 10 mL/kg (one animal) or 20 mL/kg (three animals) to the depilated abdomens of guinea pigs under an occlusive wrap for 24 hours. Animals were observed for 14 days following dosing.

Test Results

Organism	*Medium*	*Spec.*	*Route*	*Lifestage*	*Sex*	*Effect*	*Effect Comments*
GPIG			**SKN**			**LD50**	Dermal LD50 for guinea pigs was reported as >20 mL/kg (highest dose tested).

General Comments : Administration of the test material at applied doses did not cause systemic toxicity or death.

References

Primary Reference : **#URKOD***
O'Donoghue, J. L. Eastman Kodak Company Reports, TX-84-35, (1984)

Secondary Reference : **!SIDSP***
OECD/SIDS. Screening Information Data Set (SIDS) of OECD High Production Volume Chemicals Programme, (1994)

Study

End Point : **MAMMALIAN ACUTE TOXICITY**
Chemical Name : **Texanol**
CAS Number : **25265-77-4**

Species/strain/system : New Zealand rabbits
Exposure Period : **24 h**
Dose / Concentration : **16 mL/kg BW**

Test Method and Conditions

Test method description : The test chemical was applied to the skin under an impervious plastic film for 24 hours. Animals were observed for 14 days following dosing. Melon Institute Protocol; GLP: no. (Test predates GLP).

Test Results

Organism	*Medium*	*Spec.*	*Route*	*Lifestage*	*Sex*	*Effect*	*Effect Comments*
RBT			**SKN**			**LD50**	Dermal LD50 for rabbits was reported as >=16 mL/kg (15.2 g/kg).

References

Primary Reference : **TXAPA9**
Carpenter, C. P. et al. Toxicology and Applied Pharmacology, 28, 313-319, (1974)

Secondary Reference : **!SIDSP***
OECD/SIDS. Screening Information Data Set (SIDS) of OECD High Production Volume Chemicals Programme, (1994)

Study

End Point	:	**MAMMALIAN ACUTE TOXICITY**
Chemical Name	:	**Texanol**
CAS Number	:	**25265-77-4**
Species/strain/system	:	Strain not identified
Dose / Concentration	:	**800-1600 mg/kg BW**

Test Method and Conditions

Test method description	:	Eastman Kodak Company Laboratory of Industrial Medicine Protocol; GLP: no (Test predates GLP).

Test Results

Organism	*Medium*	*Spec.*	*Route*	*Lifestage*	*Sex*	*Effect*	*Effect Comments*
RAT			**IPR**			**LD50**	The estimated intraperitoneal LD50 was 800-1600 mg/kg in rats administered the neat material, and 1600-3200 mg/kg in rats and mice administered the material in corn oil.

General Comments : The neat test material was administered via intraperitoneal injection into groups of rats (2/dose) at doses of 200 to 3200 mg/kg. Groups of 2 rats and 2 mice were also injected with doses of 200 to 3200 mg/kg of the test material as a 10% suspension in corn oil, clinical signs observed included weakness, rough hair coats, tremors, convulsions, prostration, loss of reflexes and vasodilatation.

References

Primary Reference : **#URKOD***
Eastman Kodak Company Reports, (1960)

Secondary Reference : **!SIDSP***
OECD/SIDS. Screening Information Data Set (SIDS) of OECD High Production Volume Chemicals Programme, (1994)

Study

End Point : **MAMMALIAN TOXICITY**
Chemical Name : **Texanol**
CAS Number : **25265-77-4**
Study type : **LAB**

Test Subject

Organism	*Medium*	*Specification*	*Route*	*Lifestage*	*Sex*	*Number exposed*	*Number controls*
RAT			**ORL**		**M**	**12**	**12**
					F	**12**	**12**

Species/strain/system : Sprague-Dawley rats

Test Substance

Purity Grade : **99%**

Test Method and Conditions

Test method description : The test was conducted according to the proposed OECD Guideline for a Combined Repeat Dose and Reproductive) Developmental Toxicity Screening Test (Draft dated March 22, 1990); GLP: yes

Exposure

Exposure Period : **40-51 d**
Dose / Concentration : **100-1000 mg/kg BW/d**
Exposure comments : Groups of rats were administered the test article by gavage at dose levels of 0, 100, 300, or 1000 mg/kg/day. Males received 51 doses over 51 days. Females received between 40 and 51 doses of the test article during premating (14 days), mating (up to 14 days), pregnancy (21-22 days), and early lactation (4 days) periods.

Test Results

Organ	*Effect*	*Rev.*	*OnSet*	*Sex*	*Affected in Exposed - Controls*
	NEF				

No treatment-related mortality occurred in this study.

GIT	**EXOC**				

Clinical signs were restricted to sialorrhea observed in males from all three dose groups and females from the mid- and high-dose groups after administration of the test chemical. The post-dose sialorrhea may have been due to the taste of the test article.

	BEHAV		**4 d**		

A slight statistically significant decrease in feed consumption was noted in both male and female high-dose treatment groups at four days after the start of dosing.

	NEF				

No other feed consumption or body weight changes were noted.

KIDNY SIZE M
KIDNY STRUC

Statistically significantly heavier absolute and relative kidney weights were noted in the high-dose male rats and histopathological changes included accumulation of hyaline droplets in the mid- and high- dose males.

LIVER SIZE

Heavier absolute and relative liver weights were observed in the low-, mid-, and high-dose male and female groups.

LIVER CELL

Microscopic changes in the liver were noted in the mid- and high-dose groups and consisted of enlargement of hepatocytes surrounding the central vein (centrilobular hepatocytomegaly). The enlarged hepatocytes contained cytoplasm characterised by an eosinophilic "ground glass" appearance.

The liver changes were minor in all cases and associated with increased metabolic activity resulting from test article administration.

General Comments : The changes in the liver in the present study were considered to be associated with metabolic activation, rather than to a toxicological effect. Because the effects seen in the study were considered to be sequelae of metabolic activation (liver effects) or unique to male rats (kidney effects), the testing laboratory set the NOAEL for subchronic toxicity at 1000 mg/kg.

References

Primary Reference : **#URKOD***
Faber, W. D. and Hosenfeld, R. S. Eastman Kodak Company Reports, TX-92-57, (1992)

Secondary Reference : **!SIDSP***
OECD/SIDS. Screening Information Data Set (SIDS) of OECD High Production Volume Chemicals Programme, (1994)

Study

End Point : **MAMMALIAN TOXICITY**
Chemical Name : **Texanol**
CAS Number : **25265-77-4**
Study type : **LAB**

Test Subject

Organism	*Medium*	*Specification*	*Route*	*Lifestage*	*Sex*	*Number exposed*	*Number controls*
RAT			**ORL**		**M**	**5/GROUP**	**5**
					F	**5/GROUP**	**5**

Species/strain/system : Sprague-Dawley rats

Test Substance

Purity Grade : **99%**
Vehicle - Solvent : Distilled water

Test Method and Conditions

Test method description : Eastman Kodak Company Health and Environment Laboratories Protocol, similar to OECD Guideline 407; GLP: yes. Parameters evaluated included clinical observations, body weights, feed consumption, hematology, clinical chemistry, and gross and histopathology examinations.

Exposure

Exposure Type : **SHORT**
Exposure Period : **15 d**
Dose / Concentration : **100-1000 mg/kg BW/d**
Exposure comments : Groups of rats were administered the test material at doses of 0, 100, or 1000 mg/kg/day for 11 treatments over a period of 15 days.

Test Results

Organ	*Effect*	*Rev.*	*OnSet*	*Sex*	*Affected in Exposed - Controls*
-	**BEHAV**	**RV**		**M**	
BW	**DECR**				

Tansient initial reductions in feed consumption and weight gain were observed in male rats at the 1000 mg/kg dose level.

GIT **EXOC** **RV**

Clinical abnormalities were restricted to transient sialorrhea after administration of the test chemical.

NEF

There were no biologically significant differences between groups in red blood cells, hematocrit, white blood cell count, and differential white blood cell count. There were a slightly lower hemoglobin concentration in the 100 mg/kg males, and a slightly lower platelet count in the

100 mg/kg females, but these differences were not dose related and were considered unrelated to the test chemical.

NEF

Clinical chemistries (alanine amino transferase, aspartate aminotransferase, sorbitol dehydrogenase, alkaline phosphatase, creatinine, urea nitrogen, and glucose) were not affected by exposure to the test chemical.

LIVER **SIZE**

Slight increases in absolute and relative liver weights were noted in both males and females from the 1000 mg/kg group.

NEF

Absolute and relative renal weights were comparable to controls.

KIDNY **STRUC** **M**

Histopathologic examination revealed mild changes (hyaline droplet formation, a frequently observed sex- and species- specific phenomenon) in kidneys from males at both the 100 and 1000 mg/kg dose levels.

General Comments : Based on slightly increased liver weights in females at the 1000 mg/kg dose level, the no-effect dose for the female rat was 100 mg/kg. Under the conditions of this study, a no-effect dose was not obtained for males. Liver weights were increased and hyaline droplets (a sex- and species-specific effect) were seen in the kidneys in the 1000 mg/kg males, hyaline droplets were also seen in the 100 mg/kg males.

References

Primary Reference : **#URKOD***
O'Donoghue, J. L. Eastman Kodak Company Reports, TX-84-35, (1984)

Secondary Reference : **!SIDSP***
OECD/SIDS. Screening Information Data Set (SIDS) of OECD High Production Volume Chemicals Programme, (1994)

Study

End Point : **MUTAGENICITY**
Chemical Name : **Texanol**
CAS Number : **25265-77-4**
Study type : **LAB**

Test Subject

Organism	*Medium*	*Specification*	*Route*	*Lifestage*	*Sex*	*Number exposed*	*Number controls*
BACT			**VTR**				

Species/strain/system : Salmonella typhimurium TA 1535, TA 1537, TA 1538, TA 98 and TA 100

Test Substance

Purity Grade : **99%**

Test Method and Conditions

Test method description : Salmonella typhimurium assay (Ames test); GLP: yes

Exposure

Dose / Concentration : **10-3164 mg/ PLATE**
Exposure comments : The test material was tested with and without metabolic activation.

Test Results

Organ	*Effect*	*Rev.*	*OnSet*	*Sex*	*Affected in Exposed - Controls*
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NEF

Negative results. No increase in revertants was noted for concentrations between 10 mg/plate and 3164 mg/plate.

CELL

Minimum concentration at wich toxicity to bacteria was observed: 3164 mg/plate with and without metabolic activation.

References

Primary Reference : **#URKOD***
Eastman Kodak Company Reports, TX-85-5, (1985)

Secondary Reference : **!SIDSP***
OECD/SIDS. Screening Information Data Set (SIDS) of OECD High Production Volume Chemicals Programme, (1994)

Study

End Point : **MUTAGENICITY**
Chemical Name : **Texanol**
CAS Number : **25265-77-4**
Study type : **LAB**

Test Subject

Organism	*Medium*	*Specification*	*Route*	*Lifestage*	*Sex*	*Number exposed*	*Number controls*
MOUSE							

Species/strain/system : Swiss CD-1 mice

Test Substance

Purity Grade : **99%**

Test Method and Conditions

Test method description : Micronucleus Test; OECD Guideline 474 (limit dose of 2000 mg/kg); GLP: yes

Exposure

Dose / Concentration : **200-2000 mg/kg BW**
Exposure comments : Groups of animals were dosed with 0, 200, 1000, or 2000 mg/kg of test chemical.

Test Results

Organ	*Effect*	*Rev.*	*OnSet*	*Sex*	*Affected in Exposed - Controls*
	NEF				

No significant increase in micronuclei in bone marrow polychromatic erthrocytes was seen under the conditions of this assay in any dose group at any harvested time.

NEF

No effect on Mitotic Index or P/N Ratio was seen at any dose level.

2000 mg/kg produced transient acute toxicity in female mice.

General Comments : Under the conditions employed, the test article is negative in the in vivo mammalian bone marrow micronucleus assay.

References

Primary Reference : **#URKOD***
Barber, E. D. et al. Eastman Kodak Company Reports, TX-91-309, (1992)

Secondary Reference : **!SIDSP***
OECD/SIDS. Screening Information Data Set (SIDS) of OECD High Production Volume Chemicals Programme, (1994)

Study

End Point : **SENSITIZATION**
Chemical Name : **Texanol**
CAS Number : **25265-77-4**
Study type : **LAB**

Test Subject

Organism	*Medium*	*Specification*	*Route*	*Lifestage*	*Sex*	*Number exposed*	*Number controls*
			SKN				

Test Substance

Purity Grade : **99%**

Test Method and Conditions

Test method description : OECD Guideline 406 (Annex) (dated 12 May, 1981). GLP: yes

Test Results

Organ	*Effect*	*Rev.*	*OnSet*	*Sex*	*Affected in Exposed - Controls*
	NEF				

Negative result for sensitization. Number of animals with skin reaction at challenge: 0. Number of animals with skin reaction in control group at challenge: 0.

General Comments : An earlier study using a standardized topical method of induction was negative for sensitization (see Eastman Kodak Company, Laboratory of Industrial Medicine Toxicity Report, Dated February 12, 1984).

References

Primary Reference : **#URKOD***
O'Donoghue, J. L. Eastman Kodak Company Reports, (1984)

Secondary Reference : **!SIDSP***
OECD/SIDS. Screening Information Data Set (SIDS) of OECD High Production Volume Chemicals Programme, (1994)

Study

End Point	:	**IRRITATION**
Chemical Name	:	**Texanol**
CAS Number	:	**25265-77-4**
Study type	:	**LAB**

Test Subject

Organism	*Medium*	*Specification*	*Route*	*Lifestage*	*Sex*	*Number exposed*	*Number controls*
GPIG			**SKN**				

Species/strain/system : Hartley guinea pigs

Test Substance

Purity Grade : **99%**

Test Method and Conditions

Test method description : Eastman Kodak Company, Health and Environment Laboratories Protocol; GLP: yes

Exposure

Exposure Type	:	**ACUTE**
Exposure Period	:	**24 h**
Dose / Concentration	:	**5-20 mL/kg BW**
Exposure comments	:	Animals were administered a dose of 20 mL/kg (three animals), 10 mL/kg (one animal) or 5 mL/kg (one animal) to the depilated abdomen under an occlusive wrap for 24 hours.

Test Results

Organ	*Effect*	*Rev.*	*OnSet*	*Sex*	*Affected in Exposed - Controls*
SKIN	**IRRIT**				

Minimal irritation (slight to moderate erythema) was observed. Using the Draize method of evaluation, the maximum score in a single animals at 24 hours was 2. The average score at 24 hour was 0.7. The maximum score at 48 hours was 1. The average score at 48 hours was 0.3.

General Comments : The material was classified as a slight skin irritant.

References

Primary Reference : **#URKOD***
O'Donoghue, J. L. Eastman Kodak Company Reports, TX-84-35, (1984)

Secondary Reference : **!SIDSP***
OECD/SIDS. Screening Information Data Set (SIDS) of OECD High Production Volume Chemicals Programme, (1994)

Study

End Point : **IRRITATION**
Chemical Name : **Texanol**
CAS Number : **25265-77-4**
Study type : **LAB**

Test Subject

Organism	*Medium*	*Specification*	*Route*	*Lifestage*	*Sex*	*Number exposed*	*Number controls*
GPIG			**SKN**				

Species/strain/system : Hartley guinea pigs

Test Substance

Purity Grade : **99%**

Test Method and Conditions

Test method description : Eastman Kodak Company, Health and Environment Laboratories Protocol; GLP: yes

Exposure

Exposure Type : **SHORT**
Exposure Period : **9 d**
Dose / Concentration : **0.5 mL/ ANIMAL**
Exposure comments : A group of 5 animals were repeatedly administered 0.5 mL of the test chemical topically to the clipped skin of the back for a total of nine doses over an eleven-day period. Both primary irritation and exacerbation of effects were measured.

Test Results

Organ	*Effect*	*Rev.*	*OnSet*	*Sex*	*Affected in Exposed - Controls*
-	**NEF**				
SKIN	**IRRIT**				

No irritation or exacerbation was observed at the site of application in any of the 5 treated guinea pigs during the first week of dosing. During the second week, slight, transient irritation was observed in three of five animals.

References

Primary Reference : **#URKOD***
O'Donoghue, J. L. Eastman Kodak Company Reports, TX-84-35, (1984)

Secondary Reference : **!SIDSP***
OECD/SIDS. Screening Information Data Set (SIDS) of OECD High Production Volume Chemicals Programme, (1994)

Study

End Point : **IRRITATION**
Chemical Name : **Texanol**
CAS Number : **25265-77-4**
Study type : **LAB**

Test Subject

Organism	*Medium*	*Specification*	*Route*	*Lifestage*	*Sex*	*Number exposed*	*Number controls*
RBT			**SKN**				

Species/strain/system : New Zealand rabbits

Test Method and Conditions

Test method description : Mellon Institute Protocol; GLP: no. (Test predates GLP).

Exposure

Exposure comments : The test material was placed on the clipped skin of 5 rabbits. Evaluation of irritancy was based on the severest reaction observed in the 24 hours following application.

Test Results

Organ	*Effect*	*Rev.*	*OnSet*	*Sex*	*Affected in Exposed - Controls*
SKIN	**IRRIT**				

Application of the test material resulted in an irritation score of 3 using the grading procedure used in the Federal Hazardous Substances Act method, 21CFR, Past 191.

References

Primary Reference : **TXAPA9**
Carpenter, C. P. et al. Toxicology and Applied Pharmacology, 28, 313-319, (1974)

Secondary Reference : **!SIDSP***
OECD/SIDS. Screening Information Data Set (SIDS) of OECD High Production Volume Chemicals Programme, (1994)

Study

End Point : **IRRITATION**
Chemical Name : **Texanol**
CAS Number : **25265-77-4**
Study type : **LAB**

Test Subject

Organism	*Medium*	*Specification*	*Route*	*Lifestage*	*Sex*	*Number exposed*	*Number controls*
RBT			**OCU**			**6**	

Species/strain/system : New Zealand rabbits

Test Substance

Purity Grade : **99%**

Test Method and Conditions

Test method description : Eastman Kodak Company, Health and Environment Laboratories Protocol, similar to OECD Guideline 405; GLP: yes

Exposure

Exposure Type : **ACUTE**

Exposure comments : The material was instilled into six rabbit eyes. Three eyes were washed immediately.

Test Results

Organ	Effect	Rev.	OnSet	Sex	Affected in Exposed - Controls
EYE	**IRRIT**	**RV**			

Based on moderate (grade 2) erythema of the conjunctiva, the maximum score in a single unwashed eye was 4 (of a possible score of 110) after 24 hours.

EYE **NEF**

No signs of irritation were seen in washed eyes at any time. At 48 hours, the score for all eyes was 0.

General Comments : Based on the effects observed in unwashed eyes, the material was classified as a slight to moderate eye irritant.

References

Primary Reference : **#URKOD***
O'Donoghue, J. L. Eastman Kodak Company Reports, TX-84-35, (1984)

Secondary Reference : **!SIDSP***
OECD/SIDS. Screening Information Data Set (SIDS) of OECD High Production Volume Chemicals Programme, (1994)

Study

End Point : **IRRITATION**
Chemical Name : **Texanol**
CAS Number : **25265-77-4**
Study type : **LAB**

Test Subject

Organism	Medium	Specification	Route	Lifestage	Sex	Number exposed	Number controls
RBT			**OCU**				

Species/strain/system : New Zealand rabbits

Test Method and Conditions

Test method description : Mellon Institute Protocol; GLP: no. (Test predates GLP).

Test Results

Organ	*Effect*	*Rev.*	*OnSet*	*Sex*	*Affected in Exposed - Controls*
EYE	**IRRIT**				

A grade of 4 was obtained using the evaluation procedure outlined in the Federal Hazardous Substances Act, 21CFR, Part 191.

References

Primary Reference : **TXAPA9**
Carpenter, C. P. et al. Toxicology and Applied Pharmacology, 28, 313-319, (1974)

Secondary Reference : **!SIDSP***
OECD/SIDS. Screening Information Data Set (SIDS) of OECD High Production Volume Chemicals Programme, (1994)

Study

End Point : **REPRODUCTION**
Chemical Name : **Texanol**
CAS Number : **25265-77-4**
Study type : **LAB**

Test Subject

Organism	*Medium*	*Specification*	*Route*	*Lifestage*	*Sex*	*Number exposed*	*Number controls*
RAT			**ORL**		**M**	**12/GROUP**	**12**
					F	**12/GROUP**	**12**

Species/strain/system : Sprague-Dawley rats

Test Substance

Purity Grade : **99%**

Test Method and Conditions

Test method description : Test was conducted according to the proposed OECD Guideline for a Combined Repeat Dose and Reproductive/Developmental Toxicity Screening Test. GLP: yes. Parameters evaluated included clinical observations, body weights, feed consumption, reproductive indices, postnatal pup observations, and gross and histopathology examinations.

Exposure

Exposure Period : **40-51 d**
Dose / Concentration : **100-1000 mg/kg BW/d**
Exposure comments : Groups of rats were administered the test article by gavage at doses of 0, 100, 300 or 1000 mg/kg/day. Females received between 40 and 51 doses during premating (14 days), mating (up to 14 days), pregnancy (21-22 days), and easy lactation (14 days) periods. All males received 51 doses over 51 days.

Test Results

Organ	*Effect*	*Rev.*	*OnSet*	*Sex*	*Affected in Exposed - Controls*
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	NEF				

There were no toxicologically significant differences between the control and treated groups with respect to reproduction and development in male and/or female rats. Evidence for copulation was noted for a all animals.

NEF

There were no differences in the number of pregnancies, number of live or dead pups, total number of implants, prenatal loss, percent survival, total litter weight, mean pup weight, pup survival, or postnatal growth.

General Comments : Administration of the test article did not affect reproductive performance. NOEL for reproductive toxicity was 1000 mg/kg.

References

Primary Reference : **#URKOD***
Faber, W. D. and Hosenfeld, R. S. Eastman Kodak Company Reports, TX-92-57, (1992)

Secondary Reference : **!SIDSP***
OECD/SIDS. Screening Information Data Set (SIDS) of OECD High Production Volume Chemicals Programme, (1994)

Study

End Point : **TERATOGENICITY**
Chemical Name : **Texanol**
CAS Number : **25265-77-4**
Study type : **LAB**

Test Subject

Organism	*Medium*	*Specification*	*Route*	*Lifestage*	*Sex*	*Number exposed*	*Number controls*
RAT			**ORL**		**M**	**12/DOSE**	**12**
					F	**12/DOSE**	**12**

Species/strain/system : Sprague-Dawley rats

Test Substance

Purity Grade : **99%**

Test Method and Conditions

Test method description : Test was conducted according to the proposed OECD Guideline for a Combined Repeat Dose and Reproductive/Developmental Toxicity Screening Test (Draft Dated March 22, 1990); GLP: yes

Exposure

Exposure Type : **SHORT**
Exposure Period : **40-51 d**
Dose / Concentration : **100-1000 mk/kg BW/d**
Exposure comments : Groups of rats were administered the test article by gavage at dose levels of 0, 100, 300, or 1000 mg/kg/day. Female rats received between 40 and 51 doses during premating (14 days), mating (up to 14 days), pregnancy (21-22 days, and early lactation (4 days) period. Males received 51 doses over 51 days.

Test Results

Organ	*Effect*	*Rev.*	*OnSet*	*Sex*	*Affected in Exposed - Controls*
	NEF				

Administration of the test article did not affect reproductive performance in terms of mean number of live or dead pups/litter, total implants, prenatal loss, percent survival, total litter weight, mean pup weight, pup survival , external defects, and postnatal growth.

Although two dams in the high-dose group had small litters, and one pregnant dam had a full term pregnancy but no pups were found, the remaining seven litters in the high dose group averaged more pups per litter than the control group. When the litter size data were ranked and analyzed, the high

-dose group of dams were also shown to have a statistically greater number of pups than the control.

General Comments : Within the design parameters of the protocol for this test, there were no toxicologically significant differences between the control and treated groups with respect to reproduction and development. The NOEL for developmental toxicity was 1000 mg/kg.

References

Primary Reference : **#URKOD***
Faber, N. D. and Hosenfeld, R. S. Eastman Kodak Company Reports, TX-92-57, (1992)

Secondary Reference : **!SIDSP***
OECD/SIDS. Screening Information Data Set (SIDS) of OECD High Production Volume Chemicals Programme, (1994)

Study

End Point : **AQUATIC ACUTE TOXICITY**
Chemical Name : **Texanol**
CAS Number : **25265-77-4**

Species/strain/system : Five species were tested; Ramshorn snail; Aquatic earthworm; Sideswimmer; Crustacea (Pillbug); Flatworm
Dose / Concentration : **9.5-95 mg/L**

Test Substance

Description of the test substance : Purity: 99%; nominal concentration of 10 uL/L - 100 uL/L of texanol in diluent water.

Test Method and Conditions

Test method description : Eastman Kodak Company, Health and Environmental Laboratories Protocol; static; GLP: yes. Temperature, dissolved oxygen and pH were measured at 0, 24, 48, 72, and 96 hours. Observations of mortality were made at 6, 24, 48, 72, and 96 hours.

Test Results

Organism	*Medium*	*Spec.*	*Route*	*Lifestage*	*Sex*	*Effect*	*Effect Comments*
SNAIL	**AQ**					**LC50**	LC50 (96 hours) for ramshorn snail; sideswimmer, and pillbug >= 95 mg/L (100 uL/L).
WORM							
CRUS							

General Comments : Number exposed: 10/dose level, control: 10. Exposure of the five species was simultaneous with two other species (daphnia and fathead minnows) in 20 L of the test solution in a 23 L cuboidal container. All species except the snails were maintained in separate wire mesh baskets. The daphnia were also maintained in a separate mesh wire basket, and fathead minnows were maintained directly in the tank.

References

Primary Reference : **#URKOD***
Ziegler, D. A. Eastman Kodak Company Reports, ES-84-109, (1985)

Secondary Reference : **!SIDSP***
OECD/SIDS. Screening Information Data Set (SIDS) of OECD High Production Volume Chemicals Programme, (1994)

Study

End Point : **AQUATIC ACUTE TOXICITY**
Chemical Name : **Texanol**
CAS Number : **25265-77-4**

Species/strain/system : Water flea (Daphnia magna)
Dose / Concentration : **9.5-95 mg/L**

Test Substance

Purity Grade : **99%**

Test Method and Conditions

Test method description : Eastman Kodak Company, Health & Environmental Laboratories Protocol: GLP: yes. Daphnia (10/dose) were exposed to nominal concs. of texanol in diluent water. Control = 10 in diluent water without the test chemical (see general comments).

Test Results

Organism	*Medium*	*Spec.*	*Route*	*Lifestage*	*Sex*	*Effect*	*Effect Comments*
CRUS	**AQ**	**FRESH**				**LC50**	LC50 >= 95 mg/L (100 uL/L).

General Comments : Exposure was simultaneous with six other species in 20 L of test solution in a 23 L cuboidal container. Daphnia were maintained in a wire mesh basket to separate them from the other species. Other species (pillbig, sideswimmer, flatworm, and aquatic earthworm) were also maintained is separate mesh wire baskets. Fathead minnows and ramshorn snails were maintained directly in the tank. Temperature, dissolved oxygen, and pH were measured at O, 24, 48, 72, and 96 hours. Observations of mortality were made at 6, 24, 48, 72 and 96 hours.

References

Primary Reference : **#URKOD***
Ziegler, D. A. Eastman Kodak Company Reports, ES-84-109, (1985)

Secondary Reference : **!SIDSP***
OECD/SIDS. Screening Information Data Set (SIDS) of OECD High Production Volume Chemicals Programme, (1994)

Study

End Point : **AQUATIC ACUTE TOXICITY**
Chemical Name : **Texanol**
CAS Number : **25265-77-4**

Species/strain/system : Fathead minnow (Pimephales promelas)
Dose / Concentration : **9.5-95 mg/L**

Test Substance

Purity Grade : **99%**

Test Method and Conditions

Test method description : Eastman Kodak Company, Health & Environmental Laboratories Protocol; static; GLP: yes. The fish (10/dose) were exposed to nominal concs. of either 95 mg/L (100 uL/L) or 9.5 mg/L (10 uL/L) in diluent water (see general comments).

Test Results

Organism	*Medium*	*Spec.*	*Route*	*Lifestage*	*Sex*	*Effect*	*Effect Comments*
FISH	**AQ**	**FRESH**				**LC50**	LC50 = 30 mg/L (32 uL/L). The LC50 was calculated by non-linear interpolation.

General Comments : Ten individuals were also maintained in diluent water without the test chemical to serve as a control. Exposure was simultaneous with six other species in 20L of test solution in a 23 L cuboidal container. Other species (pillbug, sideswimmer, flatworm, aquatic earthworm, and daphnia) were maintained in separate mesh wire baskets. The minnows, together with ramshorn snails, were maintained directly in the tank. Temperature, dissolved oxygen, and pH were measured at 0, 24, 48, 72, and 96 hours. Observations of mortality were made at 6, 24, 48, 72, and 96 hours.

References

Primary Reference : **#URKOD***
Ziegler, D. A. Eastman Kodak Company Reports, ES-84-109, (1985)

Secondary Reference : **!SIDSP***
OECD/SIDS. Screening Information Data Set (SIDS) of OECD High Production Volume Chemicals Programme, (1994)

Study

End Point	:	**AQUATIC TOXICITY**
Chemical Name	:	**Texanol**
CAS Number	:	**25265-77-4**
Geographic Area	:	**USA**

Evaluations

Evaluation text	:	Long-term tests e.g., reproduction: no data available. Chronic daphnia, pillbug, sideswimmer, flatworm, aquatic worm, or snail studies are not deemed necessary because substance shows low acute toxicity to these organisms.

References

Secondary Reference	:	**!SIDSP*** OECD/SIDS. Screening Information Data Set (SIDS) of OECD High Production Volume Chemicals Programme, (1994)

Study

End Point	:	**AQUATIC TOXICITY**
Chemical Name	:	**Texanol**
CAS Number	:	**25265-77-4**
Study type	:	**LAB**
Geographic Area	:	**USA**

Test Subject

Organism	*Medium*	*Specification*	*Route*	*Lifestage*	*Sex*	*Number exposed*	*Number controls*
ALGAE	**AQ**	**FRESH**					

Species/strain/system : Algae (Selenastrum capricornutum)

Test Substance

Purity Grade : **99%**

Test Method and Conditions

Test method description : OECD Guideline 201; GLP: yes

Exposure

Exposure Period	:	**72 h**
Dose / Concentration	:	**2.5-80 mg/L**
Exposure comments	:	The test organism was exposed over a 72-hour period to six concs. (2.5-80 mg/L, nominal; 1.1 to 57 mg/L, measured) of texanol. Percent inhibition relative to control at 24, 48 and 72 hours was calculated for each (see general commnets).

Test Results

Organ	*Effect*	*Rev.*	*OnSet*	*Sex*	*Affected in Exposed - Controls*
---	---	---	---	---	---

EC50

The 72-hour EC value, based on analytically measured amounts of material, was 18.4 mg/L.

NOEC

NOEC (no observed effect concentration) at 72 hours was 3.28 g/L.

NEL

Maximum concentration at which no effect was observed within the period of the test = 3.28 mg/L.

LOEC

Minimum concentration at which effect was observed within the period of the test = 7.28 mg/L.

General Comments : concentration based upon the area under the growth curves. The test material is rated "moderately toxic" to the test species. However, since the test substance is ultimately biodegradable, if it were to reach the environment, adverse effects on algal growth are anticipated to be minimal.

References

Primary Reference : **MALPI***
Hughes, J. S. and Alexander, M. M. Malcom Pirnie. The toxicity of HAEL No 91-0053 to Selenastrum Capricornutum

Secondary Reference : **!SIDSP***
OECD/SIDS. Screening Information Data Set (SIDS) of OECD High Production Volume Chemicals Programme, (1994)

Study

End Point : **AQUATIC TOXICITY**
Chemical Name : **Texanol**
CAS Number : **25265-77-4**
Study type : **LAB**
Geographic Area : **USA**

Test Subject

Organism	*Medium*	*Specification*	*Route*	*Lifestage*	*Sex*	*Number exposed*	*Number controls*
MCR	**AQ**						

Species/strain/system : Bacteria; activated sludge

Test Substance

Description of the test substance : Purity: 99%

Test Method and Conditions

Test method description : Eastman Kodak Company, Health and Environmental Laboratories Protocol; IC50; Secondary Waste Treatment; GLP: yes
Temperature : **27 C**
pH : **6.9**

Exposure

Exposure Period : **5 h**
Dose / Concentration : **0.215-215 mg/L**
Exposure comments : This test utilized secondary waste treatment micro-organisms which are characteristic of actual treatment plant sludge, and which were cultured in a continuous-flow laboratory sludge unit. (see general comments).

Test Results

Organ	*Effect*	*Rev.*	*OnSet*	*Sex*	*Affected in Exposed - Controls*
---	---	---	---	---	---

EC50

EC50 for inhibition >= 215 mg/L

NOAEL

Exposure to 21.5 mg/L, 2.15 mg/L, and 0.215 mg/L had no adverse effect on glucose metabolism.

General Comments : Test exposures were conducted in respirometer flasks containing the test chemical, sludge, (14C) glucose, and 0.02 M phosphate buffer, pH 6.9. The test article exposure flasks contained the test chemical at concentrations of 215 mg/L, 21.5 mg/L, 2.15 mg/L, or 0.215 mg/L. The negative control exposure flasks contained K2Cr2O7 at 333, 167, 33, and 3.3 mg/L. All exposures were performed simultaneously and in triplicate; with gentle shaking.

References

Primary Reference : **#URKOD***
Ziegler, D. A. Eastman Kodak Company Reports, ES-84-109, (1985)

Secondary Reference : **!SIDSP***
OECD/SIDS. Screening Information Data Set (SIDS) of OECD High Production Volume Chemicals Programme, (1994)

Study

End Point	:	**TERRESTRIAL TOXICITY**
Chemical Name	:	**Texanol**
CAS Number	:	**25265-77-4**
Geographic Area	:	**USA**

Test Subject

Organism	*Medium*	*Specification*	*Route*	*Lifestage*	*Sex*	*Number exposed*	*Number controls*

BIRD

General Comments : No data available. This material is manufactured and used in such a way that significant exposure of avian life to appreciable concentrations of this substance is deemed remote.

References

Secondary Reference : **!SIDSP***
OECD/SIDS. Screening Information Data Set (SIDS) of OECD High Production Volume Chemicals Programme, (1994)

Study

End Point	:	**TERRESTRIAL TOXICITY**
Chemical Name	:	**Texanol**
CAS Number	:	**25265-77-4**
Study type	:	**LAB**
Geographic Area	:	**USA**

Test Subject

Organism	*Medium*	*Specification*	*Route*	*Lifestage*	*Sex*	*Number exposed*	*Number controls*
PLANT	**TERR**					**4x20/TYPE**	

Species/strain/system : Ryegrass (Lolium perene); Radish (Raphanus sativus); Lettuce (Lactuca sativa)

Test Substance

Description of the test substance : 95 mg/L (100 uL/L)

Purity Grade : **99%**

Test Method and Conditions

Test method description : Eastman Kodak Company, Health and Environment Laboratories Protocol; GLP: yes. End points: plant height, root length, and germination.

Exposure

Dose / Concentration : **95 mg/L**

Exposure comments : Four replicates of twenty radish, lettuce, and ryegrass seeds were dispersed in growth pouches (a total of 80 seeds for each type of plant). 20 mL of test chemical at a nominal conc. of 95 mg/L (100 uL/L) was added to (see general comments)

Test Results

Organ	*Effect*	*Rev.*	*OnSet*	*Sex*	*Affected in Exposed - Controls*
---	---	---	---	---	---

NOEC

Maximum concentration at which no effect was observed within the period of the test: no effect was seen at 95 mg/L (100 uL/L) in any of the species tested (7 days).

LOEC

Minimum (lowest) concentration at which effect was observed within the period of the test: not observed. Plants were exposed only to a concentration of 95 mg/L (100 uL/L).

General Comments : Each growth pouch, and pouches were placed in a light-tight chamber for seven days at room temperature. Criteria for inhibition were values of less than 90% of the concurrent control group for any of the three end points.

References

Primary Reference : **#URKOD***

Ziegler, D. A. Eastman Kodak Company Reports, ES-84-109, (1985)

Secondary Reference : **!SIDSP***

OECD/SIDS. Screening Information Data Set (SIDS) of OECD High Production Volume Chemicals Programme, (1994)

REACH

Adipohydrazide

EC number: 213-999-5 | CAS number: 1071-93-8

Ecotoxicological information

Toxicity to aquatic algae and cyanobacteria

S-01 | Summary

Administrative data

Link to relevant study record(s)

Description of key information

The EC50 for growth rate of Pseudokirchneriella subcapitata at 0–72 h was 8.7–9.19 mg/L. The NOEC for growth rate was 0.22–1.97 mg/L and the EC10 0.17–3.11 mg/L.

Key value for chemical safety assessment

EC50/LC50 for freshwater algae:	8.7 mg/L
EC10, LC10 or NOEC for freshwater algae:	0.22 mg/L

Additional information

The batch of Adipic acid dihydrazide tested was a white powder with a purity of 99% and the substance was completely soluble in test medium at the concentrations tested.

A final test was performed based on the results of a combined limit/range-finding test. Six exponentially growing algal cultures were exposed to an untreated control, whereas three replicates per group were exposed to 0.32, 1.0, 3.2, 10, 32 and 100 mg Adipic acid dihydrazide per litre. Initial cell density was 104 cells/ml. The total exposure period was 72 hours and samples for analytical

confirmation of exposure concentrations were taken at the start, after 24 and 72 hours of exposure.

The actual concentrations were at the level of nominal (91-98%) at the start of the test. Measured concentrations decreased to 26-73% of initial at the end of the test. The Time Weight Average (TWA) concentrations were calculated to correspond to 0.22, 0.62, 1.7, 5.5, 21 and 81 mg/l at nominally 0.32, 1.0, 3.2, 10, 32 and 100 mg/l, respectively.

The EC50 for growth rate of Pseudokirchneriella subcapitata at 0-72 h was 8.7 - 9.19 mg/L. The NOEC for growth rate was 0.22 - 1.97 mg/L and the EC10 0.17- 3.11 mg/L.

Concise International Chemical Assessment Document 22

ETHYLENE GLYCOL: Environmental aspects

First draft prepared by Dr S. Dobson, Institute of Terrestrial Ecology, Natural Environment Research Council, Huntingdon, United Kingdom

Please note that the layout and pagination of this pdf file are not identical to those of the printed CICAD

Published under the joint sponsorship of the United Nations Environment Programme, the International Labour Organisation, and the World Health Organization, and produced within the framework of the Inter-Organization Programme for the Sound Management of Chemicals.

World Health Organization
Geneva, 2000

The **International Programme on Chemical Safety (IPCS)**, established in 1980, is a joint venture of the United Nations Environment Programme (UNEP), the International Labour Organisation (ILO), and the World Health Organization (WHO). The overall objectives of the IPCS are to establish the scientific basis for assessment of the risk to human health and the environment from exposure to chemicals, through international peer review processes, as a prerequisite for the promotion of chemical safety, and to provide technical assistance in strengthening national capacities for the sound management of chemicals.

The **Inter-Organization Programme for the Sound Management of Chemicals (IOMC)** was established in 1995 by UNEP, ILO, the Food and Agriculture Organization of the United Nations, WHO, the United Nations Industrial Development Organization, the United Nations Institute for Training and Research, and the Organisation for Economic Co-operation and Development (Participating Organizations), following recommendations made by the 1992 UN Conference on Environment and Development to strengthen cooperation and increase coordination in the field of chemical safety. The purpose of the IOMC is to promote coordination of the policies and activities pursued by the Participating Organizations, jointly or separately, to achieve the sound management of chemicals in relation to human health and the environment.

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FOREWORD

Concise International Chemical Assessment Documents (CICADs) are the latest in a family of publications from the International Programme on Chemical Safety (IPCS) — a cooperative programme of the World Health Organization (WHO), the International Labour Organisation (ILO), and the United Nations Environment Programme (UNEP). CICADs join the Environmental Health Criteria documents (EHCs) as authoritative documents on the risk assessment of chemicals.

CICADs are concise documents that provide summaries of the relevant scientific information concerning the potential effects of chemicals upon human health and/or the environment. They are based on selected national or regional evaluation documents or on existing EHCs. Before acceptance for publication as CICADs by IPCS, these documents undergo extensive peer review by internationally selected experts to ensure their completeness, accuracy in the way in which the original data are represented, and the validity of the conclusions drawn.

The primary objective of CICADs is characterization of hazard and dose–response from exposure to a chemical. CICADs are not a summary of all available data on a particular chemical; rather, they include only that information considered critical for characterization of the risk posed by the chemical. The critical studies are, however, presented in sufficient detail to support the conclusions drawn. For additional information, the reader should consult the identified source documents upon which the CICAD has been based.

Risks to human health and the environment will vary considerably depending upon the type and extent of exposure. Responsible authorities are strongly encouraged to characterize risk on the basis of locally measured or predicted exposure scenarios. To assist the reader, examples of exposure estimation and risk characterization are provided in CICADs, whenever possible. These examples cannot be considered as representing all possible exposure situations, but are provided as guidance only. The reader is referred to EHC 170[1] for advice on the derivation of health-based guidance values.

While every effort is made to ensure that CICADs represent the current status of knowledge, new information is being developed constantly. Unless otherwise stated, CICADs are based on a search of the scientific literature to the date shown in the executive summary. In the event that a reader becomes aware of new information that would change the conclusions drawn in a CICAD, the reader is requested to contact IPCS to inform it of the new information.

Procedures

The flow chart shows the procedures followed to produce a CICAD. These procedures are designed to take advantage of the expertise that exists around the world — expertise that is required to produce the high-quality evaluations of toxicological, exposure, and other data that are necessary for assessing risks to human health and/or the environment.

The first draft is based on an existing national, regional, or international review. Authors of the first draft are usually, but not necessarily, from the institution that developed the original review. A standard outline has been developed to encourage consistency in form. The first draft undergoes primary review by IPCS to ensure that it meets the specified criteria for CICADs.

The second stage involves international peer review by scientists known for their particular expertise and by scientists selected from an international roster compiled by IPCS through recommendations from IPCS national Contact Points and from IPCS Participating Institutions. Adequate time is allowed for the selected experts to undertake a thorough review. Authors are required to take reviewers' comments into account and revise their draft, if necessary. The resulting second draft is submitted to a Final Review Board together with the reviewers' comments.

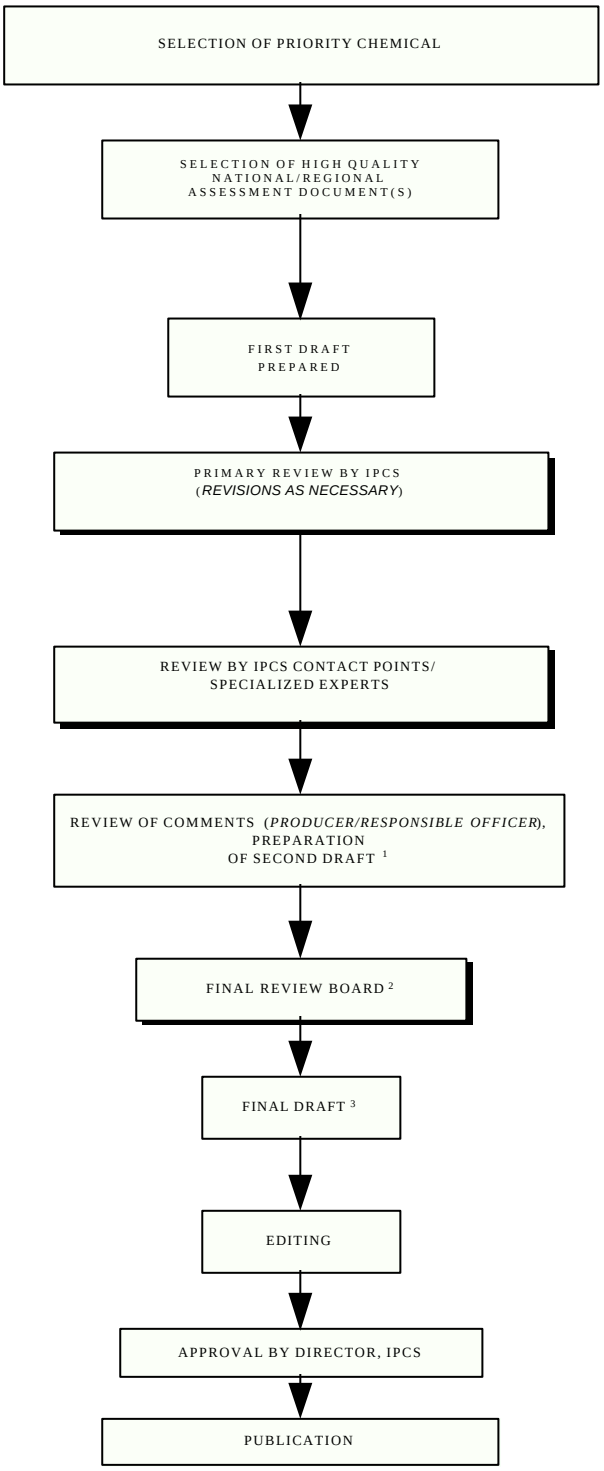
The CICAD Final Review Board has several important functions:

- to ensure that each CICAD has been subjected to an appropriate and thorough peer review;
- to verify that the peer reviewers' comments have been addressed appropriately;
- to provide guidance to those responsible for the preparation of CICADs on how to resolve any remaining issues if, in the opinion of the Board, the author has not adequately addressed all comments of the reviewers; and
- to approve CICADs as international assessments.

Board members serve in their personal capacity, not as representatives of any organization, government, or

[1] International Programme on Chemical Safety (1994) *Assessing human health risks of chemicals: derivation of guidance values for health-based exposure limits.* Geneva, World Health Organization (Environmental Health Criteria 170).

CICAD PREPARATION FLOW CHART



1 Taking into account the comments from reviewers.
2 The second draft of documents is submitted to the Final Review Board together with the reviewers' comments.
3 Includes any revisions requested by the Final Review Board.

industry. They are selected because of their expertise in human and environmental toxicology or because of their experience in the regulation of chemicals. Boards are chosen according to the range of expertise required for a meeting and the need for balanced geographic representation.

Board members, authors, reviewers, consultants, and advisers who participate in the preparation of a CICAD are required to declare any real or potential conflict of interest in relation to the subjects under discussion at any stage of the process. Representatives of nongovernmental organizations may be invited to observe the proceedings of the Final Review Board. Observers may participate in Board discussions only at the invitation of the Chairperson, and they may not participate in the final decision-making process.

1. EXECUTIVE SUMMARY

This CICAD on the environmental aspects of ethylene glycol was prepared by the Institute of Terrestrial Ecology, United Kingdom, based on the report *Environmental hazard assessment: Ethylene glycol* (Nielsen et al., 1993). The report on ethylene glycol prepared by the German Chemical Society Advisory Committee on Existing Chemicals of Environmental Relevance (BUA, 1991) was also used as a source document. In addition to these documents, a search of recent literature was conducted up to 1998. Information on the nature of the peer review process for the main source documents is presented in Appendix 1. Information on the peer review of this CICAD is presented in Appendix 2. This CICAD was approved as an international assessment at a meeting of the Final Review Board, held in Washington, DC, USA, on 8–11 December 1998. Participants at the Final Review Board meeting are listed in Appendix 3. The International Chemical Safety Card (ICSC 0270) produced by the International Programme on Chemical Safety (IPCS, 1993) has also been reproduced in this document.

Ethylene glycol (CAS No. 107-21-1) is a clear, colourless, syrupy liquid with a sweet taste but no odour. It has low volatility. It is miscible with water and some other solvents, slightly soluble in ether, but practically insoluble in benzene, chlorinated hydrocarbons, petroleum ethers, and oils. The log octanol/water partition coefficient is !1.93 to !1.36.

Estimated world production capacity was 9.4 million tonnes in 1993. Release to the environment is mainly to the hydrosphere. The largest local release to surface waters would follow ethylene glycol's use as a deicer on airport runways and planes. On a worldwide basis, approximately two-thirds of ethylene glycol is used as a chemical intermediate, with a further one-quarter used as an antifreeze in engine coolants.

Ethylene glycol released to the atmosphere will be degraded by reaction with hydroxyl radicals; the half-life for the compound in this reaction has been estimated at between 0.3 and 3.5 days.

No hydrolysis of ethylene glycol is expected in surface waters.

The compound has little or no capacity to bind to particulates and will be mobile in soil.

The low octanol/water partition coefficient and measured bioconcentration factors in a few organisms indicate low capacity for bioaccumulation.

Ethylene glycol is readily biodegradable in standard tests using sewage sludge. Many studies show biodegradation under both aerobic and anaerobic conditions. Some studies suggest a lag phase before degradation, but many do not. Degradation occurs in both adapted and unadapted sludges. Rapid degradation has been reported in surface waters (less in salt water than in fresh water), groundwater, and soil inocula. Several strains of microorganisms capable of utilizing ethylene glycol as a carbon source have been identified.

Limited data are available on measured concentrations of ethylene glycol in environmental compartments. Levels measured in surface waters have been generally low, at a few micrograms per litre. Concentrations in wastewater from production plants, prior to treatment, have averaged up to 1300 mg/litre. By far the highest reported concentrations relate to runoff water from airports, with levels up to 19 000 mg/litre.

Ethylene glycol has generally low toxicity to aquatic organisms. Toxic thresholds for microorganisms are above 1000 mg/litre. EC_{50}s for growth in microalgae are 6500 mg/litre or higher. Acute toxicity tests with aquatic invertebrates where a value could be determined show LC_{50}s above 20 000 mg/litre, and those with fish show LC_{50}s above 17 800 mg/litre. An amphibian test showed an LC_{50} for tadpoles at 17 000 mg/litre. A no-observed-effect concentration (NOEC) for chronic tests on daphnids of 8590 mg/litre (for reproductive endpoints) has been reported. A NOEC following short-term exposure of fish has been reported at 15 380 mg/litre for growth.

Tests using deicer containing ethylene glycol showed greater toxicity to aquatic organisms than observed with the pure compound, indicating other toxic components of the formulations.

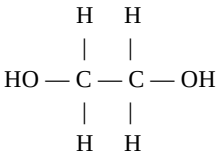
Laboratory tests exposing aquatic organisms to stream water receiving runoff from airports have demonstrated toxic effects and death. Field studies in the vicinity of an airport have reported toxic signs consistent with ethylene glycol poisoning, fish kills, and reduced biodiversity. These effects cannot definitively be ascribed to ethylene glycol.

Terrestrial organisms are much less likely to be exposed to ethylene glycol and generally show low sensitivity to the compound. Concentrations above 100 000 mg/litre were needed to produce toxic effects on yeasts and fungi from soil. Very high concentrations and soaking of seeds produced inhibition of germination in some experiments; these are not considered of environmental significance. A no-observed-effect level (NOEL) for orally dosed ducks at 1221 mg/kg body weight and

reported lethal doses for poultry at around 8000 mg/kg body weight indicate low toxicity to birds.

2. IDENTITY AND PHYSICAL/CHEMICAL PROPERTIES

Ethylene glycol ($C_2H_6O_2$; CAS No. 107-21-1) is also known as 1,2-ethanediol, 2-hydroxyethanol, 1,2-dihydroxyethane, glycol, glycol alcohol, ethylene alcohol, and monoethylene glycol or MEG. Its structure is illustrated below:



Ethylene glycol is a clear, colourless, syrupy liquid with a sweet taste but no odour. The molecular mass is 62.07. It has low volatility; its vapour pressure is 7.9 or 8.0 Pa at 20 °C (Eisenreich et al., 1981; ATSDR, 1997) and 12.2 Pa at 25 °C (HSDB, 1998). It is hygroscopic and absorbs twice its weight in water at 100% relative humidity (Budavari, 1989). It is miscible with water, lower aliphatic alcohols, glycerol, acetic acid, acetone and similar ketones, aldehydes, pyridine, and similar coal tar bases. The compound is slightly soluble in ether but practically insoluble in benzene and its homologues, chlorinated hydrocarbons, petroleum ethers, and oils (Budavari, 1989). The log octanol/water partition coefficient is !1.93 (Hansch & Leo, 1979) to !1.36.[1] Other physical and chemical properties can be found in the International Chemical Safety Card (ICSC 0270) reproduced in this document.

3. ANALYTICAL METHODS

Ethylene glycol is measured in environmental samples by gas chromatography, most commonly using flame ionization detection. Recent methods have been described using high-resolution gas chromatography coupled with mass spectrometry. Measurement in biological samples has also used gas chromatography or high-resolution gas chromatography, with additional methods employing high-performance liquid chromatography or colorimetric determination. Detection limits were not available for environmental media. Details of extraction and concentration methods can be found in ATSDR (1997).

4. SOURCES OF ENVIRONMENTAL EXPOSURE

Although ethylene glycol can be prepared directly by alkaline hydrolysis of chlorohydrin, hydrolysis of ethylene oxide is the more usual method. The feed stream consists of ethylene oxide (from either chlorohydrin or the direct oxidation of ethylene) and water. The mixture is fed under pressure into a reaction vessel at a temperature of about 100 °C, which by the end of the reaction has risen to 170 °C. Some diethylene and triethylene glycol are produced by the reaction of ethylene glycol with excess ethylene oxide. The crude glycol solution is concentrated in a multiple-effect evaporator, and final separation is achieved by distillation (Kent, 1974). Product proportions were estimated by the US EPA (1980) as follows: ethylene glycol, 87.0–88.5%; diethylene glycol, 9.3–10.5%; and triethylene glycol, 2.2–2.5%; and by ICI Chemicals and Polymers Ltd. as 90%, 9%, and 1%, respectively.[2]

Estimated world production capacity was 9.4 million tonnes in 1993.[2] Total US production capacity was estimated at approximately 3 million tonnes in 1993 (SRI, 1993); this figure had been more or less stable since 1989. United Kingdom production was estimated at 50 000 t in 1993 based on a production capacity of 85 000 t/year.[2] Production volume in Germany was a maximum of 240 000 t in 1989; breakdown of production capacity by region and country worldwide can be found in BUA (1991). Production volume in Japan increased from 560 000 t in 1992 to 751 000 t in 1996 (Chemical Daily Company, 1997).

On a worldwide basis, approximately two-thirds of ethylene glycol is used as a chemical intermediate in the manufacture of polyesters for fibres, films, bottles, etc., with a further one-quarter used as an antifreeze in engine coolants. In Western Europe, the pattern is slightly different, with about half used in polyester manufacture and a quarter in coolants. Ethylene glycol is also used for runway deicing (the main source of high local concentrations in the environment), as plasticizer for adhesives, as softener for cellulose film, as glycoborates

[1] Chou T, Hansch C (1986) Pomona College, Claremont, CA, unpublished (cited in BUA, 1991).

[2] ICI Chemicals and Polymers Ltd. (1993) Personal communication cited in Nielsen et al. (1993).

in electrolytic condensers, as glycol dinitrate in explosives, for various heat transfer applications, as humectant in inks, as antifreeze and plasticizer in paints, and to reduce gelling of medium oil alkyds based on pentaerythritol.[1] There are many different formulations of ethylene glycol and propylene glycol for use in runway deicing. In some locations, one or the other of the glycols is used alone; more usually, however, they are used together. Other components of the formulation differ widely between manufacturers, as indicated by differing toxicity (see later sections). Details of formulations are not available.

Release to the atmosphere from production and processing of ethylene glycol and production of ethylene oxide was estimated at <875 t in Germany in 1989; release to the hydrosphere was estimated at <28 t from production and >2000 t from dispersed use as an antifreeze (BUA, 1991). A maximum figure of 12 500 t of ethylene glycol release from use as antifreeze in the United Kingdom, based on production figures and proportion of use, was derived in Nielsen et al. (1993); estimated release of total volatile organics to the atmosphere from glycol production was 41–260 t/year. Industry estimates of release to the environment from use in runway deicing in the United Kingdom were 600–720 t in 1993[2]; use of the compound in runway deicers is declining. Details of releases reported through the US Toxic Release Inventory by individual state can be found in ATSDR (1997). Summary figures for the USA annually between 1990 and 1993 were as follows: 4600 t to air, 523 t to water, 577 t to soil, and 2675 t injected underground from production. Estimated figures of 6778 t released via publicly owned treatment works and 60 252 t released to the environment away from production and industrial usage sites were reported for the same period (ATSDR, 1997).

5. ENVIRONMENTAL TRANSPORT, DISTRIBUTION, AND TRANSFORMATION

Ethylene glycol has a low vapour pressure (7.9 Pa at 20 °C); it is expected to exist almost entirely in the vapour phase if released to the atmosphere (Eisenreich et al., 1981). The Henry's law constant for ethylene glycol is 1.41×10^{-3} or 6.08×10^{-3} Pa·m^3/mol, depending on method of calculation (BUA, 1991), indicating a low capacity for volatilization from water bodies or soil surfaces.

^{14}C-labelled ethylene glycol adsorbed onto silica gel and irradiated with light (wavelength >290 nm) degraded by 12.1% over 17 h (Freitag et al., 1985). Photodegradation is not expected, as the molecule should not absorb at these wavelengths; the mechanism of this breakdown is, therefore, unknown. Estimated half-life in the atmosphere for reaction with hydroxyl radicals is 2.1 days (BUA, 1991), 8–84 h (Howard et al., 1991), or 1 day (Nielsen et al., 1993).

No hydrolysis of ethylene glycol is expected in the environment (Lyman et al., 1982).

Lokke (1984) studied the adsorption of ethylene glycol to three different soils in leaching experiments. There was effectively no sorption, and soil partition coefficients ($\log K_{oc}$) of 0–0.62 were determined. Migration rates in five soil types were measured by Schramm et al. (1986) at between 4 and 27 cm per 12 h.

The low octanol/water partition coefficient of ethylene glycol ($\log K_{ow}$ −1.93 to −1.36) indicates a low potential for bioaccumulation. Bioconcentration factors of 190 for the green alga (*Chlorella fusca*) (Freitag et al., 1985), up to 0.27 in specific tissues of the crayfish (*Procambarus* sp.) (Khoury et al., 1993), and 10 for the golden orfe (*Leuciscus idus melanotus*) (Freitag et al., 1985) confirm low bioaccumulation.

In standard biodegradation tests under Organisation for Economic Co-operation and Development (OECD), US Environmental Protection Agency (US EPA), and Japanese Ministry of International Trade and Industry (MITI) guidelines, ethylene glycol was readily biodegradable.[3]

Means & Anderson (1981) measured the biodegradation of ethylene glycol under aerobic conditions in five different tests using various aqueous media. Degradation was monitored using oxygen uptake, dissolved organic carbon removal, or carbon dioxide production. Ethylene glycol was readily degraded in all tests with a lag period of up to 3 days. Degradation to 10% or less of the starting concentration was reported in all tests after between 1 and 21 days. Boatman et al. (1986) used acclimated sewage sludge as inoculum and a

[1] Chou T, Hansch C (1986) Pomona College, Claremont, CA, unpublished (cited in BUA, 1991).

[2] ICI Chemicals and Polymers Ltd. (1993) Personal communication cited in Nielsen et al. (1993).

[3] Unpublished reports from Dow Chemicals, Union Carbide, and ICI Chemicals and Polymers Ltd.; cited in IUCLID (European Union database), 1st ed., 1996.

concentration of ethylene glycol equivalent to 20 mg carbon/litre. Significant degradation, as measured by carbon dioxide production, did not occur until day 14 of the test (an estimated lag period of 8–10 days was reported). By day 21, 71% of the ethylene glycol was degraded. Using activated sludge from a petrochemicals process, 92% chemical oxygen demand (COD) removal and 93% total organic carbon removal over 24 h were reported for ethylene glycol at an initial concentration of 172 mg/litre by Matsui et al. (1975). However, direct measurement using gas chromatography showed 44% of ethylene glycol still present after 24 h; the authors explain the discrepancy as being due to poor detection of the glycol by the analytical method used. Pitter (1976) reported 96.8% removal of ethylene glycol within 120 h using adapted activated sewage sludge based on COD measurements and an initial COD of 200 mg/litre. A biodegradation rate of 41.7 mg COD/g per hour was reported. Zahn & Wellens (1980) reported >90% degradation after 4 days' incubation of ethylene glycol in a batch biodegradability study; no lag period was observed. Bridie et al. (1979) reported 36% of theoretical oxygen demand (ThOD) after 5 days' incubation at 20 °C measured as biological oxygen demand (BOD) and 100% measured as COD; using previously adapted sludge, 63% degradation as BOD was reported after 5 days. Conway et al. (1983) reported 39% of theoretical BOD after 5 days, rising to 73% by day 10 and 96% at day 20, using domestic sewage sludge inoculum. Freitag et al. (1985) reported only 5.7% degradation of ethylene glycol at 0.05 mg/litre over 5 days using municipal sewage sludge inoculum. McGahey & Bouwer (1992) studied degradation of ethylene glycol using primary sewage treatment effluent as the inoculum. After an initial lag period of 3 days, a typical first-order kinetic rate constant of 1.13 ± 0.34/day at 25 °C was reported; the half-life for the reaction was calculated at between 11.5 and 21.5 h.

Evans & David (1974) studied the biodegradation of ethylene glycol in four samples of river water under controlled laboratory conditions. The samples were dosed with ethylene glycol at 0, 2, or 10 mg/litre and incubated at either 20 °C or 8 °C. At 20 °C, primary biodegradation was complete within 3 days in all four samples; at 8 °C, it was complete by day 14. Degradation rates were further reduced at 4 °C. Price et al. (1974) assessed the biodegradation of ethylene glycol in both fresh and salt water over a 20-day incubation period. Concentrations of up to 10 mg ethylene glycol/litre were used. In fresh water, 34% degradation was observed after 5 days, rising to 86% by day 10 and 100% by day 20. Degradation was less in salt water — 20% after 5 days and 77% after 20 days.

McGahey & Bouwer (1992) studied the degradation of ethylene glycol using natural groundwater and soil inocula. An initial glycol concentration of 111 mg/litre was degraded in groundwater with a rate constant of 0.76/day at 25 °C; the lag period was less than 3 days, and the half-life was estimated at 22 h. First-order degradation rate constants for sandy loam soil and sandy silt soil were 1.01 and 2.90/day, respectively. A lag period of 3 days and a half-life of 16.5 h were reported for the sandy loam, and a lag period of 0 days and a half-life of 6 h were reported for the sandy silt. Increasing the ethylene glycol concentration to 10 000 mg/litre in the sandy loam resulted in a greatly diminished rate constant of 0.05/day and minimal degradation of the glycol. Reducing temperature in the sandy silt inoculum from 25 °C to 10 °C resulted in a decrease in the rate constant from 2.09 to 1.19/day and an increase in the half-life from 6 to 14 h; however, nearly complete degradation was observed at both temperatures within the incubation period. Biodegradation rates of ethylene glycol-based aircraft deicing fluids were examined in soil microcosms at 8 °C. Initial concentrations of 390–4900 ethylene glycol/kg soil were degraded at around 20 mg/kg per day (Klecka et al., 1993).

Haines & Alexander (1975) identified a soil bacterium (*Pseudomonas aeruginosa*) capable of degrading ethylene glycol. The bacterium had been originally grown on propylene glycol and was capable of degrading 1 mg carbon per inoculum within 2 days (based on oxygen consumption). Watson & Jones (1977) isolated bacteria from sewage effluent and identified *Acinetobacter* and *Pseudomonas* strains that degraded ethylene glycol. *Flavobacterium* isolates did not degrade the compound. However, under strongly aerobic conditions, *Flavobacterium* sp. converted ethylene glycol to glycolate and eventually carbon dioxide (Willetts, 1981).

Dwyer & Tiedje (1983) assessed the degradation of ethylene glycol in methanogenic enrichments of bacteria obtained from municipal sewage sludge. The bacterial inoculum was dominated by two morphological types of bacteria, *Methanobacterium* sp. and *Desulfovibrio* sp. A concentration of 36 mmol ethylene glycol/litre (2.2 g/litre) was incubated at 37 °C, and, based on analysis of the compound, 100% of the glycol was metabolized within 12 days. Products of degradation included ethanol, acetate, and methane. Battersby & Wilson (1989) assessed the degradation of ethylene glycol under methanogenic conditions using primary digesting sludge from a sewage treatment plant receiving both domestic and industrial wastewater. Degradation was assessed as total gas production. The glycol at a concentration of 50 mg carbon/litre sludge was incubated at 35 °C for 60 days.

Total degradation was achieved after 1–2 weeks (>80% of theoretical gas production), and a short lag period of <1 day was reported. In anaerobic conditions using an inoculum from a pretreatment lagoon for petrochemical waste, ethylene glycol at a concentration of 135 mg/litre was degraded to 78% after 10 days; at 755 mg/litre, degradation was 75–79% complete (Hovious et al., 1973). Under anaerobic conditions, ethylene glycol was degraded by 89% within 7 days (Kameya et al., 1995). The anaerobic bacterium *Clostridium glycolicum* isolated from pond ooze and adapted to ethylene glycol could degrade 5.3 or 6.7 g ethylene glycol/litre under anaerobic conditions (Gaston & Stadtman, 1963). Non-adapted *Acetobacter* strains could degrade ethylene glycol at concentrations between 5 and 15 g/litre using the compound as sole carbon source under anaerobic conditions (Kaushal & Walker, 1951; Hrotmatka & Polesofsky, 1962).

Following a spill of ethylene glycol in New Jersey, USA, in which 15 000 litres of coolant containing ethylene glycol as antifreeze at 275 g/litre were spilled, concentrations of the glycol in soil and groundwater were measured at 4.9 and 2.1 g/litre, respectively. A remediation procedure was initiated involving the pumping of nitrogen, phosphate, and oxygen-saturated water into the contaminated ground; after 26 days, 85–93% of the glycol had been degraded by naturally occurring microorganisms. After 9 months, the concentration of ethylene glycol was below the detection limit of 50 mg/litre (Flathman et al., 1989).

6. ENVIRONMENTAL LEVELS

The Japan Environment Agency (1991) reported the results of two environmental surveys of surface waters and sediments carried out in 1977 and 1986. In the earlier survey, ethylene glycol was not detected in six samples of water and sediment (detection limits 0.1–0.4 mg/litre and 1–2 mg/kg, respectively). In the later survey, the compound was not detected in 24 sediment samples (detection limit 0.06 mg/kg) but was found in 2 out of 24 water samples at levels of 1.3 and 2 ：g/litre (detection limit 0.8 ：g/litre).

Monitoring of ethylene glycol in runoff from airports has been reviewed by Sills & Blakeslee (1992); levels in runoff water ranged up to several thousand mg/litre. Concentrations up to 19 000 mg/litre were reported for Salt Lake City International Airport, Salt Lake City, UT, USA, up to 3100 mg/litre for Lester B. Pearson International Airport in Toronto, Ontario, Canada, and up to 5050 mg/litre at Stapleton International Airport in Denver, CO, USA. Concentrations of up to 70 mg/litre were measured in stream water receiving runoff from Lester B. Pearson International Airport. Ethylene glycol was not detected in soil at the edge of runways in Denver, but levels of the compound in groundwater below the sandy soil of Ottawa International Airport, Ottawa, Ontario, Canada, were measured at up to 415 mg/litre; concentrations peaked in June and declined to non-detectable in the autumn.

Pitt et al. (1975) sampled the primary effluent from a municipal sewage treatment plant. No details are given in the report, but levels of ethylene glycol were reported at 3 ：g/litre. Zeithoun & McIllhenny (1971) identified ethylene glycol in the wastewater from glycol production; in 51 samples from two production plants, concentrations in wastewater ranged from 680 to 2300 mg/litre (average 1003–1306 mg/litre). In a similar number of samples from two 1,2-propanediol production plants, concentrations of ethylene glycol in wastewater ranged from 355 to 2550 mg/litre (average 960–1140 mg/litre). Grabinska-Loniewska (1974) identified ethylene glycol as a constituent of wastewater from a polyester fibre plant in Poland. Concentrations ranged from 200 to 440 mg/litre (average 200 mg/litre, number of samples unspecified).

Influent-contaminated groundwater to a bioremediation plant in California, USA, contained ethylene glycol at up to 103 mg/litre (Ross et al., 1988).

Lee et al. (1983) detected ethylene glycol in two samples of Asiatic clams (*Corbicula* sp.); no levels were reported.

Ethylene glycol was detected in ambient air at time-weighted averages of <0.05–0.33 mg/m^3 as aerosol and <0.05–10.4 mg/m^3 as vapour following spray application of deicer containing 50% of the compound to bridges (LDOTD, 1990).

Ethylene glycol has been identified as a metabolite of the growth regulator ethylene in a number of higher plants (Blomstrom & Beyer, 1980) and as naturally occurring in the edible fungus *Tricholoma matsutake* (Ahn & Lee, 1986).

7. EFFECTS ON ORGANISMS IN THE LABORATORY AND FIELD

7.1 Aquatic organisms

Results of acute toxicity tests on aquatic organisms are summarized in Table 1. Chronic toxicity tests were conducted on water fleas (*Ceriodaphnia dubia*) over the period taken by 60% of the controls to produce three broods. NOECs for mortality at 24 000 mg/litre and for reproduction at 8590 mg/litre were reported; an IC_{25} of 12 310 mg/litre was calculated. Seven-day toxicity tests conducted on the fathead minnow (*Pimephales promelas*) gave NOECs for mortality and growth at 32 000 mg/litre and 15 380 mg/litre, respectively, with an IC_{25} at 22 520 mg/litre (Pillard, 1995). Masters et al. (1991) exposed *Ceriodaphnia dubia* to ethylene glycol in the US EPA standard 7-day chronic toxicity test and also concurrently carried out 4-day tests to compare results. Survival and production of young were monitored. A "chronic index," the geometric mean of the NOEC and lowest-observed-effect concentration (LOEC), was determined to be 4.2 mg/litre for production of young in both tests and >6.0 and 4.2 mg/litre for survival in the 4- and 7-day tests, respectively. Actual NOECs and LOECs were not reported.

Mayes et al. (1983) compared the toxicity of ethylene glycol to fathead minnows at three different ages (fry, 10–15 days old; juveniles, 30–35 days old; and subadults, 60–94 days old) and found no effect of age. However, Mayer & Ellersieck (1986) found older (1.1 g) rainbow trout (*Oncorhynchus mykiss*) more sensitive than younger (0.7 g) fish.

Ethylene glycol did not produce narcosis in tadpoles of the common frog (*Rana temporaria*) at 28 550 mg/litre; tadpoles did become sluggish after 5–6 h of exposure, but did not lose their responsiveness to stimuli. However, death followed within 12–20 h. At 14 275 mg/litre, tadpoles kept moving for 24–30 h but died after about 36–48 h (Lipnick, 1991).

A reported 48-h LC_{50} value for tadpoles of the clawed toad (*Xenopus laevis*) at 326 mg/litre (DeZwart & Slooff, 1987) is considered invalid for the setting of standards following correspondence from the authors. The study was part of a technicians' training course, and no quality control was exercised.

7.1.1 Toxicity of deicer formulations

Pillard (1995) conducted acute and chronic tests on water fleas (*C. dubia*) and fathead minnows using both pure ethylene glycol and formulations of deicer based on the compound. For acute tests, 48-h LC_{50}s for the daphnid were 34 440 and 13 140 mg/litre for the pure substance and formulation, respectively; chronic NOECs for survival were 24 000 and 8400 mg/litre, respectively, and for reproduction, 8590 and <3330 mg/litre, respectively. For acute tests on the minnows, 96-h LC_{50}s were 72 860 and 8050 mg/litre, respectively; chronic NOECs for survival were 32 000 and 6090 mg/litre and for growth were 15 380 and <3330 mg/litre, respectively. The higher toxicity of formulations was ascribed to other unknown constituents of the formulations, including rust inhibitors, buffers, polymers, and surfactants. Hartwell et al. (1995) conducted toxicity tests using ethylene glycol-based deicer and determined 96-h LC_{50}s for fathead minnow, *Daphnia magna*, *D. pulex*, and *C. dubia* at 10 802, 4213, 4675, and 9845 mg glycol/litre, respectively. Seven-day exposure of fathead minnows produced an identical LC_{50}. A maximum acceptable toxicant concentration (MATC) for reproduction of *Ceriodaphnia* was calculated at 418 mg/litre. Gill and kidney lesions and calcium oxalate crystals were found in exposed fish. The same species were also cultured in stream water taken from an outflow stream from stormwater basins at Baltimore Washington International Airport, Maryland, USA, receiving runoff from deicing of runways. No fish mortality was seen in either March or April water samples over 7 days. However, oxalate crystals were seen after 7 days' exposure to the March water. Significant reduction in survival of *D. magna* and *D. pulex* was recorded over 96 h in the March water sample. *Ceriodaphnia dubia* showed reduced survival only after 7 days, and production of neonates was also reduced to 55% of controls. No significant adverse effects on daphnids was seen with the April water (neonate production was significantly increased in *Ceriodaphnia*).

Toxicity of formulations will vary considerably depending on the particular constituents. For example, Union Carbide's UCAR 50/50 EG-Based Type I fluid for the 1997–98 aircraft deicing season has lower aquatic toxicity figures than those quoted in the literature: *D. magna*, 48-h EC_{50} 88 000 mg/litre; fathead minnow, 96-h LC_{50} 44 000 mg/litre; rainbow trout, 96-h LC_{50} 34 200 mg/litre.[1] For an assessment of likely effects in the field, toxicity values for particular formulations used will need to be determined.

7.1.2 Field effects

During early summer, 3 months after release of glycols into streams draining from airport stormwater basins (Baltimore Washington International Airport), fish were sampled from the stream. In tesselated darters

[1] Personal communication to IPCS.

Table 1: Acute toxicity of ethylene glycol to aquatic organisms.

Organism	End-point	Concentration (mg/litre)	Reference
Microorganisms			
bacterium *Pseudomonas putida*; protozoa *Entosiphon sulcatum*, *Uronema parduczi*	Toxic threshold (cell multiplication)	>10 000	Bringmann & Kuhn (1980a,b)
cyanobacterium *Microcystis aeruginosa*	Toxic threshold (cell multiplication)	2000	Bringmann & Kuhn (1976)
bacterium *Pseudomonas aeruginosa*	EC_0 (growth)	1000	Daugherty (1980)
	EC_{100} (growth)	2000	
bacterium *Photobacterium phosphoreum*	30-min EC_{50} (luminescence)	621	Kaiser & Palabrica (1991)
	5-min EC_{50}	112 220	Calleja et al. (1993)
	5-min EC_{50}	166 000	Kahru et al. (1996)
bacteria from aquatic sediment and sewage sludge	EC_{50} (growth)	114 300	Khoury et al. (1990)
bacteria from sewage sludge	EC_{50} (oxygen uptake)	224 600	Kilroy & Gray (1992)
anaerobic bacteria from sewage sludge	Toxic threshold	5000	Hoechst (1975)
flagellate euglenoid	EC_5 (growth in population)	>10 000	AQUIRE[a]
Algae			
green alga *Scenedesmus quadricauda*	Toxic threshold	>10 000	Bringmann & Kuhn (1980a)
green alga *Selenastrum capricornutum*	96-h EC_{50} (growth, cell counts)	6500–7500	Dow[b]
	96-h EC_{50} (growth, cell volume)	9500–13 000	
	168-h EC_{50} (growth, cell volume)	24 000	
Invertebrates			
water flea *Daphnia magna*	48-h LC_{50} (immobilization)	>10 000	Conway et al. (1983)
		50 000	Hermens et al. (1984)
		41 000–51 000	Gersich et al. (1986)
		74 400	Calleja et al. (1994)
		14 828[c]	Hartwell et al. (1995)
	24-h LC_{50}	>10 000	Bringmann & Kuhn (1977)
	24-h NOEC	2500	
water flea *Ceriodaphnia dubia*	48-h LC_{50}	25 800	Cowgill et al. (1985)
		(22 600–29 900)	
		34 440	Pillard (1995)
crayfish *Procambarus* sp.	96-h LC_{50}	91 430	Khoury et al. (1990)
common shrimp *Crangon vulgaris*	96-h LC_{50}	50 000	AQUIRE[a]
brine shrimp *Artemia salina*	24-h LC_{50}	>20 000	Price et al. (1974)
		180 420	Calleja et al. (1994)
brown shrimp *Crangon crangon*	96-h LC_{50}	~50 000	Blackman (1974)
Fish			
rainbow trout *Oncorhynchus mykiss*	96-h LC_{50}	>18 500	Jank et al. (1974)
		17 800–45 600	Mayer & Ellersieck (1986)
guppy *Poecilia reticulata*	168-h LC_{50}	49 300	Konnemann (1981)
bluegill sunfish *Lepomis macrochirus*	96-h LC_{50}	>111 300	Mayer & Ellersieck (1986)
		27 540	Khoury et al. (1990)

Organism	End-point	Concentration (mg/litre)	Reference
fathead minnow *Pimephales promelas*	96-h LC_{50}	>10 000 49 000–57 000 72 860	Conway et al. (1983) Mayes et al. (1983) Pillard (1995)
goldfish *Carassius auratus*	24-h LC_{50}	>5000	Bridie et al. (1979)
Japanese killifish *Oryzias latipes*	48-h NOEC	900	Tsuji et al. (1986)
Amphibians			
frog (tadpoles) *Rana brevipoda*	48-h LC_{50}	17 000	Nishiushi (1984)

[a] AQUIRE (Aquatic Information Retrieval) Computerized database developed by the US Environmental Protection Agency.
[b] Dow (undated) Personal communication to IPCS.
[c] Value based on ethylene glycol content of a deicing product.

(*Etheostoma olmstedi*), oxalate crystals appeared in the interstitial tissue of the kidneys and basal layers of tubules. American eels (*Aguilla rostrata*) exhibited kidney lesions consistent with oxalate damage, but no crystals were found.[1] Pillard (1995) cites his own unpublished report as showing fish kills in streams near airports and aquatic community impairment in three streams receiving runoff from airports.

7.2 Terrestrial organisms

Incubation of yeast (*Saccharomyces cerevisiae*) in ethylene glycol at a concentration of 150 g/litre produced a 1% reduction in glucose utilization; a concentration of 172.5 g/litre produced <10% inhibition (Gray & Sova, 1956). Concentrations of 200 g ethylene glycol/litre prevented germination of conidia of the ascomycete fungus *Neurospora crassa*; return to clean medium allowed germination. Concentrations greater than 200 g/litre killed the spores (Bates & Wilson, 1974). Using oxygen uptake and growth (turbidity) as end-points, Khoury et al. (1990) reported an IC_{50} for heterotrophic soil microorganisms at 114 300 mg/litre.

Bose & Bandyopadhyay (1975) soaked tomato seeds in ethylene glycol solution at 5.5 g/litre. Only 50% of the soaked seeds germinated, but those that did grew higher, bloomed earlier, and carried twice the crop of untreated plants. Soaking of cluster bean (*Cyamopsis tetragonoloba*) in aqueous ethylene glycol solutions at 10 or 20 g/litre for 8 h, following an initial 4-h soak in water, led to some plants showing small leaves with shortened petioles, stunted growth, and sterility (Bose & Naskar, 1975). Twenty-three percent of rice seeds soaked in aqueous ethylene glycol at 10 g/litre for 24 h germinated (compared with 48% of controls). Germinated plants showed only marginal effects on growth, panicle length, grain weight, and fertility, but tiller numbers were reduced by 40–50% compared with controls (Bose & Bhattacharyya, 1975). Jute (*Corchorus capsularis*) seeds soaked in ethylene glycol solution at 2 g/litre showed 84% of control levels of germination. Plants that germinated following treatment required 8 days longer to blossom, on average, showed a higher degree of pollen sterility, and produced fewer and lighter seeds than controls (Bose & Datta, 1973). Tobacco (*Nicotiana xanthi*) plants sprayed with 5 ml of a solution of ethylene glycol at 34. 51.5, or 69 g/litre showed a dose-dependent 10–33% reduction in terminal bud fresh weight, but no other overt effects were noted (Steffens & Barer, 1984).

Toxic effects (unspecified) were noted in chickens fed a diet containing 5% ethylene glycol for 27 days (Yoshida et al., 1969). An LC_{50} for ethylene glycol in drinking-water at 75 100 mg/litre over 24 h was reported for chickens (Riddell et al., 1967). No deaths were seen in chickens exposed through drinking-water at 27 800 mg/litre, but renal oxalosis was observed. Chickens exposed at 14 500 mg/litre drinking-water showed calcium oxalate crystals in renal tubules, but no clinical signs were reported. Beasley & Buck (1980) reported lethal doses for poultry to lie within the range of 7790–8900 mg/kg body weight. A NOEL of 1221 mg/kg body weight and a lowest-observed-effect level (LOEL) of 2553 mg/kg body weight were reported for orally dosed mallard ducks (*Anas platyrhynchos*) (Stowe et al., 1981).

8. EFFECTS EVALUATION

Ethylene glycol released to the atmosphere will be degraded by reaction with hydroxyl radicals; the half-life for this reaction has been estimated at between 0.3 and 3.5 days.

[1] Unpublished reports cited by Hartwell et al. (1995).

No hydrolysis of ethylene glycol is expected in surface waters.

The compound has little or no capacity to bind to particulates and will be mobile in soil.

The low octanol/water partition coefficient and measured bioconcentration factors in a few organisms indicate low capacity for bioaccumulation.

Ethylene glycol is readily biodegradable in standard tests using sewage sludge. Many studies show biodegradation under both aerobic and anaerobic conditions. Some studies suggest a lag phase before degradation, but many do not. Degradation occurs in both adapted and unadapted sludges. Rapid degradation has been reported in surface waters (less in salt water than in fresh water), groundwater, and soil inocula. Several strains of microorganisms capable of utilizing ethylene glycol as a carbon source have been identified.

Limited data are available on measured concentrations of ethylene glycol in environmental compartments. Levels measured in surface waters have been generally low, at a few micrograms per litre. Concentrations in wastewater from production plants, prior to treatment, have averaged up to 1300 mg/litre. By far the highest reported concentrations relate to runoff water from airports, with levels up to 19 000 mg/litre.

Ethylene glycol has generally low toxicity to aquatic organisms. Toxic thresholds for microorganisms are above 1000 mg/litre. EC_{50}s for growth in microalgae are 6500 mg/litre or higher. Acute toxicity tests with aquatic invertebrates where a value could be determined show LC_{50}s above 20 000 mg/litre, and those with fish show LC_{50}s above 17 800 mg/litre. The only valid acute toxicity value for amphibians is 17 000 mg/litre for *Rana brevipoda* tadpoles. A NOEC for chronic tests on daphnids of 8590 mg/litre (for reproductive end-points) has been reported. A NOEC following short-term exposure of fish has been reported at 15 380 mg/litre for growth.

Tests using deicer containing ethylene glycol generally showed greater toxicity to aquatic organisms than the pure compound, indicating other toxic components of the formulations.

Laboratory tests exposing aquatic organisms to stream water receiving runoff from airports have demonstrated toxic effects and death. Field studies in the vicinity of an airport have reported toxic signs consistent with ethylene glycol poisoning (oxalate crystal formation), fish kills, and reduced biodiversity. These effects cannot definitively be ascribed to ethylene glycol.

Terrestrial organisms are much less likely to be exposed to ethylene glycol and generally show low sensitivity to the compound. Concentrations above 100 000 mg/litre were needed to produce toxic effects on yeasts and fungi from soil. Very high concentrations and soaking of seeds produced inhibition of germination in some experiments; these are not considered of environmental significance. A NOEL for orally dosed ducks at 1221 mg/kg body weight and reported lethal doses for poultry at around 8000 mg/kg body weight indicate low toxicity to birds.

8.1 Predicted environmental concentration

There are reported measurements of ethylene glycol in the influx wastewater to treatment plants at industrial sites manufacturing the compound. These will be used as the basis for calculating a predicted environmental concentration (PEC) after treatment. Average concentrations up to 1306 mg/litre have been reported.

Based on this emission concentration, and using mainly default values from the OECD Technical Guidance Manual, the initial concentration in river water would be as follows:

$$PEC_{local\ (water)} = C_{effluent}/[(1 + K_{p(susp)} \times C_{(susp)}) \times D]$$

where:

- $PEC_{local\ (water)}$ is the predicted environmental concentration (g/litre)

- $C_{effluent}$ is the concentration of the chemical in the wastewater treatment plant effluent (g/litre), calculated as $C_{effluent} = I \times (100 - P)/100$, where:
  - I = input concentration to the wastewater treatment plant (1.3 g/litre)
  - P = percent removal in the wastewater treatment plant (91%, based on the "ready biodegradability" of the compound)

- $K_{p(susp)}$ is the suspended matter/water adsorption coefficient, calculated as $K_{p(susp)} = f_{oc(susp)} \times K_{oc}$, where:
  - $f_{oc(susp)}$ = the fraction of organic carbon in suspended matter (default 0.1)
  - K_{oc} = $0.411 \times K_{ow}$

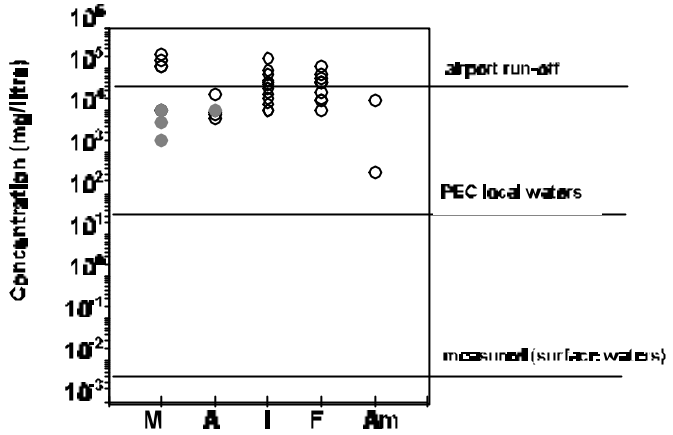


Figure 1: Plot of reported acute toxicity values for ethylene glycol in microorganisms (M), algae (A), invertebrates (I), fish (F) and amphibians (Am) with predicted or measured environmental concentrations

where:

K_{ow} = the octanol/water partition coefficient (log K_{ow} = −1.36)

- $C_{(susp)}$ is the concentration of suspended matter in the river water in kg/litre (default concentration 15 mg/litre)

- D is the dilution factor for river flow (a conservative default value of 10)

Under these very conservative conditions, $PEC_{local\ (water)}$ = 11.7 mg/litre. This is substantially higher than reported concentrations in surface water and represents a conservative estimate of initial maximum concentration.

8.2 Predicted no-effect concentration

There is a substantial database on the toxicity of ethylene glycol to aquatic organisms, representing acute and chronic test results for two trophic levels and acute and short-term results for a third. The distribution of test results is presented in Figure 1 for different types of organism. The shaded points represent toxic thresholds for microorganisms or algae, and these are not considered a suitable basis for estimating a predicted no-effect concentration (PNEC). It would be justifiable to apply an uncertainty factor of 10 to the chronic NOEC for daphnid reproduction at 8590 mg/litre given the wide range of available data. This gives a PNEC of 859 mg/litre.

8.3 Environmental risk factors

It is clear from Figure 1 that risk to aquatic organisms from production of ethylene glycol is very low, even based on conservative assumptions; a risk factor of 0.013 is generated by comparing $PEC_{local\ (water)}$ against PNEC. Based on the few measured values in surface waters, risk would be negligible (risk factor at 2.3×10^{-6}).

It is also clear that concentrations in airport runoff would be expected to cause severe field effects without mitigation. It is difficult to estimate likely dilution of runoff in generalized terms; however, dilution factors of at least 100-fold would be needed for the reported concentrations. Concentrations may be substantially higher in runoff water at particular airport sites. There is indication that formulations might be significantly more toxic to aquatic organisms than the pure ethylene glycol. It is also unlikely that only ethylene glycol formulations would be used. The ready biodegradability of glycols also increases risk to organisms from oxygen depletion in surface waters. Risk assessment and field monitoring of overt effects should be applied on a case-by-case basis to determine pollution control measures needed.

ETHYLENE GLYCOL

0270
March 1999

CAS No: 107-21-1
RTECS No: KW2975000
EC No: 603-027-00-1

1,2-Ethanediol
1,2-Dihydroxyethane
$HOCH_2CH_2OH$
Molecular mass: 62.1

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/SYMPTOMS	PREVENTION	FIRST AID/FIRE FIGHTING
FIRE	Combustible.	NO open flames.	Powder, alcohol-resistant foam, water spray, carbon dioxide.
EXPLOSION			
EXPOSURE		**PREVENT GENERATION OF MISTS!**	
Inhalation	Cough. Dizziness. Headache.	Ventilation.	Fresh air, rest. Artificial respiration if indicated. Refer for medical attention.
Skin	Dry skin.	Protective gloves.	Remove contaminated clothes. Rinse skin with plenty of water or shower.
Eyes	Redness. Pain.	Safety goggles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
Ingestion	Abdominal pain. Dullness. Nausea. Unconsciousness. Vomiting.	Do not eat, drink, or smoke during work.	Rinse mouth. Induce vomiting (ONLY IN CONSCIOUS PERSONS!). Refer for medical attention. If no medical personnel are available and the patient is conscious, ingestion of alcoholic beverage may prevent kidney failure.

SPILLAGE DISPOSAL	PACKAGING & LABELLING
Collect leaking and spilled liquid in sealable containers as far as possible. Wash away remainder with plenty of water. (Extra personal protection: A/P2 filter respirator for organic vapour and harmful dust).	Xn Symbol R: 22 S: 2

EMERGENCY RESPONSE	STORAGE
NFPA Code: H1; F1; R0	Separated from strong oxidants, strong bases. Dry. Ventilation along the floor.

IPCS
International Programme on Chemical Safety

Prepared in the context of cooperation between the International Programme on Chemical Safety and the European Commission

SEE IMPORTANT INFORMATION ON THE BACK.

IMPORTANT DATA

Physical State; Appearance
ODOURLESS, COLOURLESS, VISCOUS, HYDROSCOPIC LIQUID

Chemical dangers
On combustion, forms toxic gases. Reacts with strong oxidants and strong bases.

Occupational exposure limits
TLV (as STEL): 100 mg/m^3 (ceiling values) (ACGIH 1998).

Routes of exposure
The substance can be absorbed into the body by inhalation and through the skin.

Inhalation risk
A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C.

Effects of short-term exposure
The substance irritates the eyes and the respiratory tract. The substance may cause effects on the the kidneys and central nervous system, resulting in renal failure and brain injury. Exposure could cause lowering of consciousness.

Effects of long-term or repeated exposure
The substance may have effects on the central nervous system, resulting in abnormal eye movements (nystagmus).

PHYSICAL PROPERTIES

Boiling point: 198°C
Melting point: -13°C
Relative density (water = 1): 1.1
Solubility in water: miscible
Vapour pressure, Pa at 20°C: 7
Relative vapour density (air = 1): 2.1
Relative density of the vapour/air-mixture at 20°C (air = 1): 1.00
Flash point: 111°C (c.c.)
Auto-ignition temperature: 398°C
Explosive limits, vol% in air: 3.2-15.3
Octanol/water partition coefficient as log Pow: -1.93

ENVIRONMENTAL DATA

NOTES

The occupational exposure limit value should not be exceeded during any part of the working exposure.

ADDITIONAL INFORMATION

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APPENDIX 1 — SOURCE DOCUMENTS

Nielsen IR, Malcolm HM, Dobson S (1993) *Environmental hazard assessment: Ethylene glycol*. Garston, United Kingdom Department of the Environment, Building Research Establishment, Toxic Substances Division (TSD/16)

The first draft of the Environmental Hazard Assessment (EHA) documents are extensively circulated both within the United Kingdom and internationally for peer review. Comments received are dealt with in the final published version. For this EHA document on ethylene glycol, comments were received from the United Kingdom Department of the Environment (Wastes Technical Division and Global Atmosphere Division), the Health and Safety Executive (United Kingdom), the Ministry of Agriculture, Fisheries and Food (United Kingdom), the Water Research Centre (United Kingdom), The Edinburgh Centre for Toxicology, Heriot-Watt University, the US Environmental Protection Agency, the Swedish National Chemicals Inspectorate, the Umweltbundesamt, Germany, and ICI Chemicals and Polymers Ltd.

BUA (1991) *Ethylene glycol*. GDCh-Advisory Committee on Existing Chemicals of Environmental Relevance (BUA). Hirzel, Wissenschaftliche Verlagsgesellschaft (BUA Report 92.S)

For the BUA review process, the company that is in charge of writing the report (usually the largest producer in Germany) prepares a draft report using literature from an extensive literature search as well as internal company studies. This draft is subject to a peer review during several readings of a working group consisting of representatives from government agencies, the scientific community, and industry.

The English translation of this report was published in 1994.

APPENDIX 2 — CICAD PEER REVIEW

The draft CICAD on ethylene glycol was sent for review to institutions and organizations identified by IPCS after contact with IPCS national Contact Points and Participating Institutions, as well as to identified experts. Comments were received from:

Chemical Manufacturers' Association, Arlington, USA

Chinese Academy of Preventive Medicine, Beijing, People's Republic of China

European Chemical Industry Council (CEFIC), Brussels, Belgium

Health and Safety Executive, Bootle, United Kingdom

Health Department of Western Australia, Perth, Australia

National Institute of Health Sciences, Tokyo, Japan

National Institute of Public Health, Prague, Czech Republic

Senatskommission der Deutschen Forschungsgemeinschaft, Bonn, Germany

United States Department of Health and Human Services (National Institute of Environmental Health Sciences, Research Triangle Park), USA

United States Environmental Protection Agency (Region VIII; National Center for Environmental Assessment, Washington, DC), USA

World Health Organization/International Programme on Chemical Safety, Montreal, Canada

APPENDIX 3 — CICAD FINAL REVIEW BOARD

Washington, DC, USA, 8–11 December 1998

Members

Dr T. Berzins, National Chemicals Inspectorate (KEMI), Solna, Sweden (*Vice-Chairperson*)

Mr R. Cary, Toxicology Unit, Health Directorate, Health and Safety Executive, Bootle, Merseyside, United Kingdom (*Rapporteur*)

Dr S. Dobson, Institute of Terrestrial Ecology, Monks Wood, Abbots Ripton, Huntingdon, Cambridgeshire, United Kingdom

Dr O. Faroon, Agency for Toxic Substances and Disease Registry, Centers for Disease Control and Prevention, Atlanta, GA, USA

Dr G. Foureman, National Center for Environmental Assessment, US Environmental Protection Agency, Research Triangle Park, NC, USA

Dr H. Gibb, National Center for Environmental Assessment, US Environmental Protection Agency, Washington, DC, USA (*Chairperson*)

Dr R.F. Hertel, Federal Institute for Health Protection of Consumers & Veterinary Medicine, Berlin, Germany

Dr I. Mangelsdorf, Documentation and Assessment of Chemicals, Fraunhofer Institute for Toxicology and Aerosol Research, Hanover, Germany

Dr A. Nishikawa, Division of Pathology, National Institute of Health Sciences, Tokyo, Japan

Dr E.V. Ohanian, Office of Water/Office of Science and Technology, Health and Ecological Criteria Division, US Environmental Protection Agency, Washington, DC, USA

Dr J. Sekizawa, Division of Chem-Bio Informatics, National Institute of Health Sciences, Tokyo, Japan

Professor P. Yao, Institute of Occupational Medicine, Chinese Academy of Preventive Medicine, Ministry of Health, Beijing, People's Republic of China

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Ms K.L. Lang (CEFIC, European Chemical Industry Council, representative), Shell International, London, United Kingdom

Ms K. Roberts (ICCA representative), Chemical Self-funded Technical Advocacy and Research (CHEMSTAR), Chemical Manufacturers Association, Arlington, VA, USA

Dr W. Snellings (ICCA representative), Union Carbide Corporation, Danbury, CN, USA

Dr M. Sweeney, Document Development Branch, National Institute for Occupational Safety and Health, Cincinnati, OH, USA

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Ms M. Godden, Health and Safety Executive, Bootle, Merseyside, United Kingdom

Dr R.G. Liteplo, Environmental Health Directorate, Health Canada, Ottawa, Ontario, Canada

Ms L. Regis, Programme for the Promotion of Chemical Safety, World Health Organization, Geneva, Switzerland

Mr A. Strawson, Health and Safety Executive, London, United Kingdom

Dr P. Toft, Programme for the Promotion of Chemical Safety, World Health Organization, Geneva, Switzerland

RÉSUMÉ D'ORIENTATION

Ce CICAD relatif aux problèmes d'ordre écologique posés par l'éthylène-glycol a été préparé par l'Institut d'Ecologie terrestre (Royaume-Uni) sur la base d'un rapport intitulé *Environmental hazard assessment: Ethylene glycol* (Nielsen et al., 1993). Le rapport sur l'éthylène-glycol rédigé par le Comité consultatif de la Société allemande de Chimie pour les produits chimiques qui posent des problèmes écologiques (BUA, 1991) a également été utilisé comme source de données. Parallèlement, il a été procédé à un dépouillement de la littérature récente (jusqu'en 1998).On trouvera à l'appendice 1 des indications sur la méthode utilisée par les pairs pour examiner les principales sources documentaires. Les renseignements concernant l'examen du CICAD par les pairs font l'objet de l'appendice 2. Ce CICAD a été approuvé en tant qu'évaluation internationale lors de la réunion du Comité d'évaluation finale qui s'est tenue à Washington du 8 au 11 décembre 1998. La liste des participants à cette réunion figure à l'appendice 3. La fiche d'information internationale sur la sécurité chimique (ICSC No 0270) relative à l'éthylène-glycol, établie par le Programme international sur la sécurité chimique (IPCS, 1993) est également reproduite dans ce document.

L'éthylène-glycol (No CAS 107-21-1) se présente sous la forme d'un liquide limpide, incolore et sirupeux, de saveur sucrée mais dépourvu d'odeur. Il est peu volatil. Il est miscible à l'eau et à certains autres solvants, légèrement soluble dans l'éther mais pratiquement insoluble dans le benzène, les hydrocarbures chlorés, l'éther de pétrole et les huiles. Son coefficient de partage entre l'octanol et l'eau (log K_{ow}) est compris entre !1,93 et !1,36.

On estime que la capacité de production mondiale était de 9,4 millions de tonnes en 1993. La libération d'éthylène-glycol dans l'environnement se produit principalement au niveau de l'hydrosphère. Localement, c'est par suite de l'utilisation du composé dans les aéroports pour dégivrer les pistes et les avions que les décharges dans l'environnement devraient être les plus importantes. Dans l'ensemble du monde, environ les deux tiers de la production d'éthylène-glycol sont utilisés comme intermédiaire dans la préparation d'autres composés et à peu près un quart comme antigel pour moteurs.

L'éthylène-glycol libéré dans l'atmosphère subit une décomposition par suite de sa réaction sur les radicaux hydroxyle; dans ces conditions, sa demi-vie se situe entre 0,3 et 3,5 jours.

Il ne devrait pas subir d'hydrolyse dans les eaux de surface.

Il a peu, voire pas de propension à se fixer aux particules et présente une certaine mobilité pédologique.

La faible valeur de son coefficient de partage entre l'octanol et l'eau et de son facteur de bioconcentration dans un certain nombre d'organismes fait présager une tendance peu marquée à la bioaccumulation.

Les tests habituels sur boues d'égouts révèlent une bonne biodégradabilité. De nombreuses études montrent qu'il y a biodégradation en aérobiose comme en anaérobiose. Selon certains travaux, la biodégradation est retardée, mais selon d'autres elle ne l'est pas. La décomposition se produit dans les boues adaptées comme dans celles qui ne le sont pas. On a fait état d'une décomposition rapide dans les eaux de surface (moindre dans l'eau salée que dans l'eau douce), les eaux souterraines et les inoculums de sol. Certaines souches de microorganismes sont capables d'utiliser l'éthylène-glycol comme source de carbone.

On n'a guère de données sur les concentrations mesurées dans les divers compartiments de l'environnement. Dans les eaux superficielles, la concentration d'éthylène-glycol est généralement faible, de l'ordre de quelques microgrammes par litre. Dans des effluents industriels provenant d'unités de production, on a mesuré des concentrations avant traitement allant jusqu'à 1 300 mg/litre en moyenne. Les concentrations de loin les plus élevées sont celles que l'on trouve dans les eaux de ruissellement des aéroports, avec des valeurs qui peuvent atteindre 19 000 mg/litre.

L'éthylène-glycol est généralement peu toxique pour les organismes aquatiques. Pour les microorganismes, le seuil de toxicité est supérieur à 1 000 mg/litre. Dans le cas des algues microscopiques, la CE_{50} relative à la croissance est supérieure ou égale à 6 500 mg/litre. Les tests de toxicité aiguë sur invertébrés aquatiques dont on a pu tirer une valeur, montrent que la CL_{50} se situe au-delà de 20 000 mg/litre; ceux qui ont été pratiqués sur des poissons donnent des valeurs supérieures à 17 800 mg/litre. Un test sur amphibien a montré que la CL_{50} pour les têtards était égale à 17 000 mg/litre. Les études de toxicité chronique portant sur la reproduction des daphnies ont permis de fixer à 8 590 mg/litre la concentration sans effet observable (NOEC). En prenant la croissance pour critère, on a obtenu une NOEC de 15 380 mg/litre pour des poissons brièvement exposés.

Les tests effectués avec des dégivrants à base d'éthylène-glycol montrent que ces produits sont plus toxiques pour les organismes aquatiques que l'éthylène-

glycol pur, ce qui indique que ces dégivrants contiennent d'autres substances toxiques.

Lors de tests de laboratoire comportant l'exposition d'organismes aquatiques à l'eau d'une rivière recevant les eaux de ruissellement d'un aéroport, on a constaté des effets toxiques pouvant aller jusqu'à la mort. Des études effectuées sur le terrain à proximité d'un aéroport ont révélé que les organismes aquatiques présentaient des signes d'intoxication qui pourraient être dus à l'éthylène-glycol, avec en outre présence de poissons morts et réduction de la biodiversité. Il n'est toutefois pas absolument certain que ces effets puissent être attribués à l'éthylène-glycol.

Les organismes terrestres ont beaucoup moins de chances d'être exposés à de l'éthylène-glycol et ils sont généralement peu sensibles à ce composé. Il a fallu des concentrations supérieures à 100 000 mg/litre pour produire des effets toxiques sur des champignons et des levures prélevés dans le sol. On a pu provoquer une inhibition de la germination en plongeant des semences dans des bains contenant une très forte concentration d'éthylène-glycol, mais ces résultats n'ont aucune signification sur le plan écologique. Chez des canards ayant reçu de l'éthylène-glycol par voie digestive, la dose sans effet observable (NOEL) se situait à 1221 mg/kg de poids corporel; pour les poulets, la dose létale serait d'environ 8 000 mg/kg p.c. Ces valeurs montrent que le composé est peu toxique pour les volatiles.

RESUMEN DE ORIENTACIÓN

El presente CICAD sobre los aspectos ambientales del etilenglicol, preparado por el Instituto de Ecología Terrestre del Reino Unido se basa en el informe de Evaluación de los peligros para el medio ambiente: Etilenglicol (Nielsen *et al.*, 1993). Se utilizó también como documento original el informe sobre el etilenglicol que había preparado el Comité Consultivo sobre Sustancias Químicas Importantes para el Medio Ambiente de la Sociedad Alemana de Química (BUA, 1991). Además de usar estos documentos, se realizó una búsqueda de la bibliografía reciente hasta 1998. La información acerca del carácter del proceso de examen colegiado para los principales documentos originales figura en el apéndice 1. La información relativa al examen colegiado de este CICAD se presenta en el apéndice 2. Su aprobación como evaluación internacional se realizó en una reunión de la Junta de Evaluación Final, celebrada en Washington, DC, Estados Unidos, los días 8-11 de diciembre de 1998. La lista de participantes en esta reunión figura en el apéndice 3. La Ficha internacional de seguridad química (ICSC 0270), preparada por el Programa Internacional de Seguridad de las Sustancias Químicas (IPCS, 1993), también se reproduce en el presente documento.

El etilenglicol (CAS Nº 107-21-1) es un líquido denso, claro, incoloro, de sabor dulce, pero inodoro. Tiene una volatilidad baja. Es miscible con el agua y algunos otros disolventes, ligeramente soluble en éter, pero prácticamente insoluble en benceno, hidrocarburos clorados, éteres de petróleo y aceites. El log del coeficiente de reparto octanol/agua oscila entre !1,93 y !1,36.

La capacidad de producción mundial estimada en 1993 fue de 9,4 millones de toneladas. La liberación en el medio ambiente se produce fundamentalmente en la hidrosfera. La liberación local más importante a las aguas superficiales es consecuencia de la utilización de etilenglicol como descongelante en las pistas de los aeropuerto y en los aviones. Unos dos tercios de la producción mundial de etilenglicol se utilizan como intermediario químico, con otra cuarta parte como anticongelante en los refrigerantes de los motores.

El etilenglicol que se libera en la atmósfera se degrada por reacción con radicales hidroxilo; la semivida del compuesto en esta reacción se ha calculado entre 0,3 y 3,5 días.

No se prevé que haya hidrólisis del etilenglicol en aguas superficiales.

El compuesto tiene poca o ninguna capacidad de unión a partículas y es móvil en el suelo.

El bajo coeficiente de reparto octanol/agua y los factores de bioacumulación medidos en un pequeño número de organismos indican una capacidad escasa de bioacumulación.

El etilenglicol es fácilmente biodegradable en pruebas normalizadas utilizando lodos cloacales. En numerosos estudios se ha puesto de manifiesto su biodegradación en condiciones tanto aerobias como anaerobias. Algunos estudios parecen indicar una fase estacionaria antes de la degradación, pero otros muchos no. Se produce degradación tanto en lodos adaptados como no adaptados. Se ha notificado una degradación rápida en las agua superficiales (inferior en la salada que en la dulce), el agua freática y los inóculos del suelo. Se han identificado varias cepas de microorganismos capaces utilizar el etilenglicol como fuente de carbono.

Se dispone de datos limitados sobre las concentraciones de etilenglicol medidas en los compartimentos del medio ambiente. Los niveles medidos en las aguas superficiales generalmente han sido bajos, de algunos microgramos por litro. Las concentraciones en las aguas residuales de instalaciones de producción antes del tratamiento han alcanzado un promedio de hasta 1 300 mg/litro. Las concentraciones con diferencia más altas de las notificadas corresponden al agua de escorrentía de los aeropuertos, con concentraciones de hasta 19 000 mg/litro.

El etilenglicol suele tener una toxicidad baja para los organismos acuáticos. El umbral tóxico para los microorganismos es superior a 1 000 mg/litro. Las CE_{50} para el crecimiento en las microalgas son de 6 500 mg/litro o superiores. En las pruebas de toxicidad aguda con invertebrados acuáticos en las que se pudo determinar un valor se obtuvieron CL_{50} superiores a 20 000 mg/litro, y con peces por encima de 17 800 mg/litro. En una prueba realizada con anfibios se observó una CL_{50} para los renacuajos de 17 000 mg/litro. Se ha notificado una concentración sin efectos observados (NOEC) para pruebas crónicas en dáfnidos de 8 590 mg/litro (para los efectos finales reproductivos). Tras una exposición breve de peces se notificó una NOEC para el crecimiento de 15 380 mg/litro.

En pruebas en las que se utilizó descongelante que contenía etilenglicol se puso de manifiesto una toxicidad para los organismos acuáticos superior a la observada con el compuesto puro, lo que indica la presencia de otros componentes tóxicos en las formulaciones.

En pruebas de laboratorio de exposición de organismos acuáticos a una corriente de agua receptora de la escorrentía de los aeropuertos aparecieron efectos tóxicos y letales. En estudios sobre el terreno realizados en las cercanías de un aeropuerto se han notificado signos tóxicos compatibles con la intoxicación por etilenglicol, muerte de peces y reducción de la biodiversidad. Estos efectos no se pueden atribuir de manera definitiva al etilenglicol.

Es mucho menos probable que los organismos terrestres estén expuestos al etilenglicol y en general muestran una sensibilidad baja al compuesto. Se necesitaron concentraciones superiores a 100 000 mg/litro para producir efectos tóxicos en levaduras y hongos del suelo. En algunos experimentos se observó que las concentraciones muy altas y la impregnación de las semillas inhibían la germinación; estos efectos no se consideran importantes para el medio ambiente. La concentración sin efectos observados (NOEL) para patos a los que se administró por vía oral 1 221 mg/kg de peso corporal y las dosis letales notificadas para aves de corral de alrededor de 8 000 mg/kg de peso corporal indican una toxicidad baja para las aves.

SWECO Environment
Screening Rapport 2008:1

Screening of biocides and organic halogens

Client

Swedish Environmental Protection Agency

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SWECO Environment AB
Södra Regionen

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Sammanfattning

Bakgrund och metoder

Inom ramen för screeningprogrammet 2007 så har SWECO Environment på uppdrag av Naturvårdsverket genomfört mätningar av följande ämnen:

- Tolylfluanid som används som en fungicid vid odling av frukt och blommor, vid betning av frön samt som en biocid i färger och träoljor för exteriört bruk
- Klortalonil som används som en biocid i träimpregneringsprodukter samt (utanför Sverige) i båtbottenfärger.
- Diuron som tidigare har använts som ett viktigt ogräsbekämpningsmedel på banvallar, vägar och dikesrenar. Numera används ämnet endast i vattenbaserade färger och oljor för exteriört bruk.
- Cypermetrin som används för bekämpning av skadeinsekter i skogsbruket samt i villaträdgårdar
- Kathon som används för att bekämpa mikroorganismer i en rad hushållsprodukter såsom schampo, tvålar och hudvårdsprodukter. Kathon används även i industriella rengöringsprodukter samt inom pappersindustrin som ett slembekämpningsmedel. Observera att Kathon egentligen består av två ämnen, 2-methyl-3-isothiazolinone (MI) samt 5-chloro-2-methyl-3-isothiazolinone (CMI).
- Propikonazol som används för att bekämpa påväxt av svamp i färger och träoljor. Ämnet används också som en fungicid inom lantbruket.

Dessa ämnen har mätts i ett flertal matriser i provpunkter som påverkas av olika diffusa källor eller punktkällor. Provtagningen genomfördes nationellt med provpunkter som valdes av Naturvårdsverket och SWECO samt regionalt med provpunkter som valdes av respektive länsstyrelse. Resultaten från den regionala samt den nationella provtagningen samutvärderades.

Projektets målsättning har varit att klargöra de huvudsakliga källorna för dessa ämnen till miljön, kartlägga halterna av dessa ämnen i miljön, samt om ämnena påträffas, översiktligt bedöma huruvida de uppmätta halterna utgöra en risk för hälsa och/eller miljö.

En provtagningsstrategi togs fram som omfattade jord, grundvatten, ytvatten, sediment, dagvatten, sediment från dagvattenbrunnar samt avloppsvatten, slam och utloppsvatten från reningsverk.

De huvudsakliga utsläppskällorna till de ämnen som undersöktes var:

- Plantskolor (tolylfluanid och cypermetrin).
- Anläggningar för beredning eller tillverkning av färg (tolylfluanid, propikonazol, diuron, kathon, cypermetrin).
- Deponier som tar emot byggavfall (tolylfluanid, propikonazol, diuron, kathon, cypermetrin).
- Lantbruk (tolylfluanid och propikonazol).
- Lagringsplatser för behandlat eller målat virke (tolylfluanid, propikonazol, diuron, kathon).
- Jord nedanför nyligen målade fasader (tolylfluanid).
- Bangårdar och banvallar (diuron).
- Båtuppställningsplatser (klortalonil).
- Tillfälliga lagringsplatser för timmer (cypermetrin).
- Dagvatten från villaträdgårdar (cypermetrin).
- Reningsverk (Kathon).
- Pappers- och massaindustrier (Kathon).
- Enskilda avlopp (Kathon).

Svenska bakgrundshalter i ytvatten och sediment mättes i referenssjöar. Dessutom mättes bakgrundshalter i jord i anslutning till referenssjöarna.

Slutsatser och rekommendationer

Det tycks inte finnas något samband mellan använda mängder av biocider och deras förekomst i miljön. Kathon används t.ex. i en lång rad produkter och i förhållandevis stora mängder men förekommer inte i något prov i denna studie. I en tysk screeningstudie som nyligen genomförts påträffades kathon endast i ett fåtal prov i inkommande vatten till reningsverk och inte alls i andra matriser (sediment, ytvatten). Diuron däremot, som numera mestadels används i vattenbaserade färger, förekommer i ett antal prover både nära punktkällor och i bakgrundområden. Den troligaste orsaken till dessa skillnader är att Diuron är mycket persistent i miljön medan Kathon bryts ner betydligt lättare.

Endast cypermetrin påträffades (i jord) i halter som eventuellt kan ge effekter. Även om diuron och propikonazol i några enskilda fall påträffades i förhållandevis höga halter i avloppsvatten, slam, dagvatten samt grundvatten så var halterna i jord, sediment och ytvatten långt under möjliga effektnivåer.

Några huvudsakliga slutsatser från denna undersökning är:

- De funna halterna av biocider utgör inte några direkta miljö- eller hälsoproblem.
- Färgindustrier, lagringsplatser för impregnerat virke, deponier samt möjligtvis villaträdgårdar tycks vara de några av de viktigaste källorna för dessa ämnen till miljön
- Cypermetrin kan vara en möjlig kandidat för vidare screening. Dels för att de funna halterna i ytjord när timmerlagringsplatser var nära möjliga effektnivåer och dels för att cypermetrin återfanns i hälften av dagvattenproverna från villaträdgårdar. Vidare screening bör möjligtvis fokusera på användning i villaträdgårdar.
- Kolortalonil och Kathon (CMI och MI) påträffades inte i några prov och det finns således inte något behov av vidare screening av dessa ämnen. Möjligtvis bör nedbrytningsprodukter av Kathon utredas vidare eftersom deras persistens och toxicitet är okänd i nuläget.
- Diuron påträffades nära punktkällor och vid bakgrundssjöar. Möjligtvis finns det ett behov av en begränsad screeningsstudie av biologiska prov för att utröna nuvarande halter i biota samt om halterna ökar eller minskar i biota.
- Tolylfluanid återfanns endast i ett fåtal prov och vidare screening av detta ämne är inte nödvändigt. Däremot behöver Tyska undersökningar av nedbrytningsprodukter av tolyfluanid utvärderas för att bedöma om dessa behöver ingå i screeningsstudier i Sverige.

Summary

Background and methods
Within the screening program of 2007 SWECO Environment has had the assignment from the Swedish Environmental Protection Agency to measure the occurrence of:

- Tolylfluanid which is used as fungicide in fruit and flower cultivations, as a seed disinfectant and as a biocide in paint and wood oil products.
- Chlorothalonil which is used as a biocide in wood preservation products and in boat paints.
- Diuron which has been commonly used as a weed killer on railway embankments, roads and parking lots. Today the substance is used as a biocide in water based paints and (outside of Sweden) in boat paints.
- Cypermethrin which is used as an insecticide in forestry and for household applications to control arthropods.
- Kathon which is used as a preservative for the control of microorganisms in aqueous-based industrial products such as cleaning agents and in cosmetics, toiletries and household products such as shampoos, other hair and skin care products, fabric softeners or polishes. Kathon is also widely used as a slemicide in the pulp and paper industry.
- Propiconazole which is used as a fungicide in paint and wood oil products for exterior use to prevent the forming of mould during storage and underneath the painted surface. It is also used in cereal crops and grass seed cultivations.

These substances were measured in various matrices affected by different activities and in background areas in Sweden. The sampling was performed on a national level with sampling points chosen by SWECO and on a regional level with sampling points chosen by regional county boards. Results from the national and the regional screening were collectively evaluated.

The objectives of the project were to elucidate the main sources of these substances to the environment, to elucidate the levels of these substances in the environment and if the substances are found briefly assess whether the levels constitute an environmental and/or health problem.

A national sampling strategy was devised which included soil, groundwater, surface water, sediments, storm water, sediments from storm water manholes as well as incoming water, sludge and effluents from sewage treatment plants.

The major sources to the environment of the investigated substances were:

- Forest seedling nurseries (tolylfluanid, cypermethrin).
- Paint manufacturing industries.
- Landfills receiving painted and impregnated building material (tolylfluanid, propikonazol, diuron, kathon, cypermethrin).
- Agriculture (tolylfluanid, propiconazole).
- Sites where painted and/or impregnated wood is stored (tolylfluanid, propikonazol, diuron, kathon)
- Soils below outdoor building surfaces that had been recently painted (tolylfluanid)
- Railway yards and railway embankments where diuron has been used as a weed killer.
- Marinas (chlorthalonil)
- Intermittent storage sites for timber (cypermethrin)
- Storm water from detached houses and villa gardens (cypermethrin)
- Waste water treatment plants (Kathon)
- Pulp and paper industries (Kathon)
- Single house sewage plants (Kathon)

Swedish environmental background levels in surface water and sediments were determined in reference lakes and in soil in the vicinity of these lakes.

Conclusions and recommendations

There does not seem to be a relation between the amounts of biocides used and the occurrence in the environment. This is exemplified by Kathon that is used in a large number of products but was never found in any sample. Diuron on the other hand is used in smaller amounts, in a few products, but was found at background lakes and in a number of samples at point sources, such as paint factories.

Only Cypermethrin was found at levels (in soil) that could cause any immediate effects. On a few occasions diuron and propiconazole were found at high levels (relative to effect concentrations) in incoming water, storm water, ground water and sludge. However, they were well below any effect levels in surface water, soils and sediments.

Some main conclusions and recommendations are:

- The screened biocides are not found at levels that give rive to any immediate environmental and/or health concern.

- Paint industries, storage sites for treated wood and/or landfills seem to be the most important sources of propiconazole, diuron and tolylfluanid to the environment.
- Cypermethrin is a possible candidate for further screening. The substance was detected in storm water from areas with detached houses and in the topsoil at sites where timber is stored. Further screening should focus on the usage of cypermethrin in pesticides for villa gardens and for protection of felled timber.
- Chlorothalonil and the kathon substances CMI and MI were not detected in any samples. There is no further need for screening of these substances. However, the need for screening of kathon biodegradation products can not be excluded since the stability and ecotoxicity of these compounds is largely unknown.
- It may be pertinent to review German screening studies on the occurrence of degradation products of tolylfluanid before deciding if these should be investigated in the future.

1 Introduction

1.1 Background

At present there is a lack of knowledge regarding the emission, distribution and exposure for many of the chemicals emitted to the environment. The aim of the screening program financed by the Swedish Environmental Protection Agency (Swedish EPA) is to alleviate this lack of knowledge by estimating the occurrence of different chemicals in the environment in relevant matrices (soil, water etc.).

To maximize the information gained from the screening program, measurements are made in many matrices at many sites, but with few samples per site.

The Swedish EPA is responsible for the screening at the national level and selects the chemicals that are to be included. The regional county boards have the option to complement and extend the sampling program by choosing additional sampling point that are of regional interest.

Within the screening program of 2007, SWECO Environment has had the assignment from the Swedish EPA to measure the occurrence of the following biocides and organic halogens:

- tolylfluanide
- chlorothalonil
- diuron
- cypermethrin
- propiconazole
- kathon

All of these substances are used as biocides either directly (in agricultural applications) or in products. Consequently they are all designated as biocides in the following text.

1.2 Objectives

The objectives of the project were to:

- To elucidate the main sources of these substances to the environment.
- To elucidate the levels of these substances in the environment.

- If the substances are found, briefly assess whether the levels constitutes an environmental problem.

1.3 Substance information

1.3.1 Tolylfluanid

Tolylfluanid is used as a fungicide in fruit and flower cultivations and as a seed disinfectant. The Swedish Chemical Agency has recently (2007) revoked all permits for the usage of tolylfluanid in agriculture. The reason is the discovery of a previously unknown degradation product (dimethylsulfamide) which in turn can form nitrosamines when drinking water is treated with ozone. Nitrosamines are known carcinogenics and German authorities have found dimethylsulfamide in both surface water and groundwater.

Tolylfluanid is also a very common fungicide in a number of paint and wood oil products to prevent the forming of mould during storage and underneath the painted surface.

The registered[1] amounts of tolylfluanid in Sweden from the year 1993 – 2005 are presented in figure 1.1 below. Physiochemical and (eco)toxicological properties are presented in table 1.1.

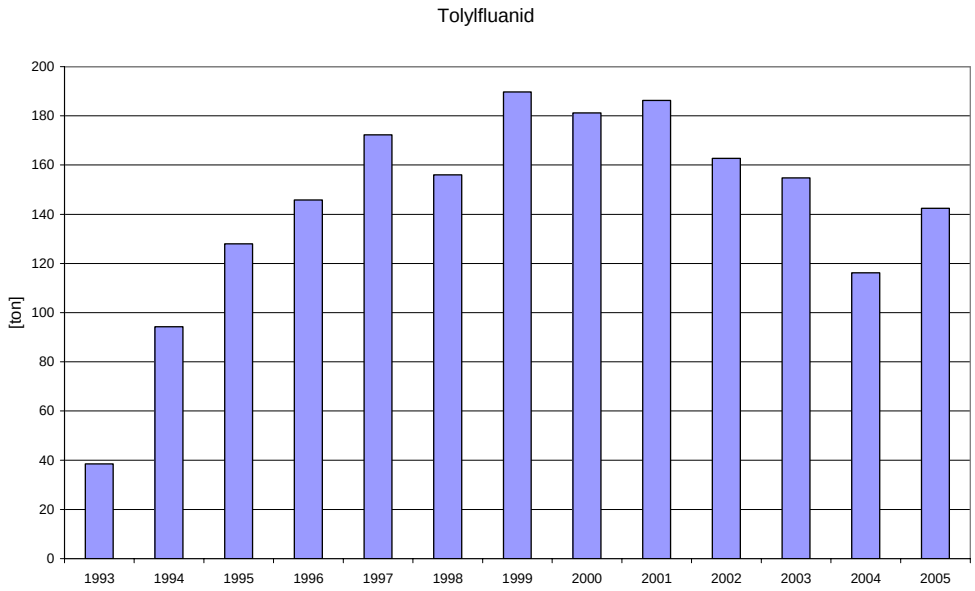
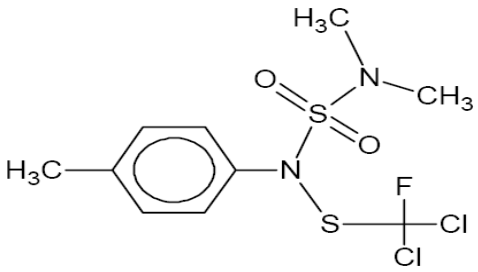


Figure 1.1 Registered amounts of tolylfluanid in Sweden from the year 1993 – 2005

[1] The statistics are based on the amount of pure substance or substance in products that companies have filed to the Swedish Chemicals Agency.

Table 1.1 Physiochemical and (Eco)toxicological properties. Source: SWECO (2006)

Common name	**Tolylfluanid**			
				
Name	Methanesulfenamide, 1,1-dichloro-N-[(dimethylamino)sulfonyl]-1-fluoro-N-(4-methylphenyl)-			
CAS #	731-27-1			
Classification	T; R23 Xn; R48/20 Xi; R36/37/38 R43 N; R50-53			
		Min	Max	Unit
Physical and chemical properties	Water solubility	0.9		mg/l
	Water – organic carbon partition coefficient (K_{oc})	1728	3200	
	Henrys constant	$8*10^{-7}$		$atm*m^3/mol$
	Vapor pressure	$2*10^{-6}$		mmHg
Aquatic ecotoxicology	LC_{50} and EC_{50}	0.045	23	mg/l
	NOEC och LOEC	0.0031	0.032	mg/l
Terrestrial ecotoxicology	LC_{50} and EC_{50}	1000	1000	mg/kg soil
	NOEC and LOEC	-	-	mg/kg soil
Toxicology (vertebrates, mostly rats and mice).	Oral LD_{50} = 250 – 5000 mg/kg. Dermal LD_{50} = 500 – 5000 mg/kg.			
PBT classification	P b T			
Theoretical reduction in waste treatment plants	26 %			
Theoretical environmental partitioning	air – 2.46 % , water – 81.3 %, soil – 12.4 %, sediment – 3.89 %			
Guideline values	Swedish surface waters[1]: 0.2 µg/l			

[1] The Swedish Chemicals Agency has developed guideline values for pesticides in surface waters. The guideline values represent the highest concentration where no negative ecological effects are expected. These values are not binding and are only meant to assist the interpretation of results from environmental monitoring.

1.3.2 Chlorothalonil

Chlorothalonil is used as a biocide in wood preservation products and, in other countries, boat paints (Piedral et al. 2000, Vasilios et al. 2002). Previously it was used as a fungicide in agriculture, mainly in greenhouse growing of cucumbers. Due to its known carcinogenic effects its use in agriculture has been revoked. The usage of a number of paint products containing chlorothalonil has also been revoked by the Swedish Chemical Agency. If a paint or wood preservation product contains very low concentrations of chlorothalonil there is no requirement to reveal the occurrence in a safety data sheet. Consequently, it is difficult to elucidate the precise products that contain this substance.

The registered[2] amounts of chlorothalonil in Sweden from the year 1994– 2005 are presented in figure 1.2 below. Physiochemical and (eco)toxicological properties are presented in table 1.2

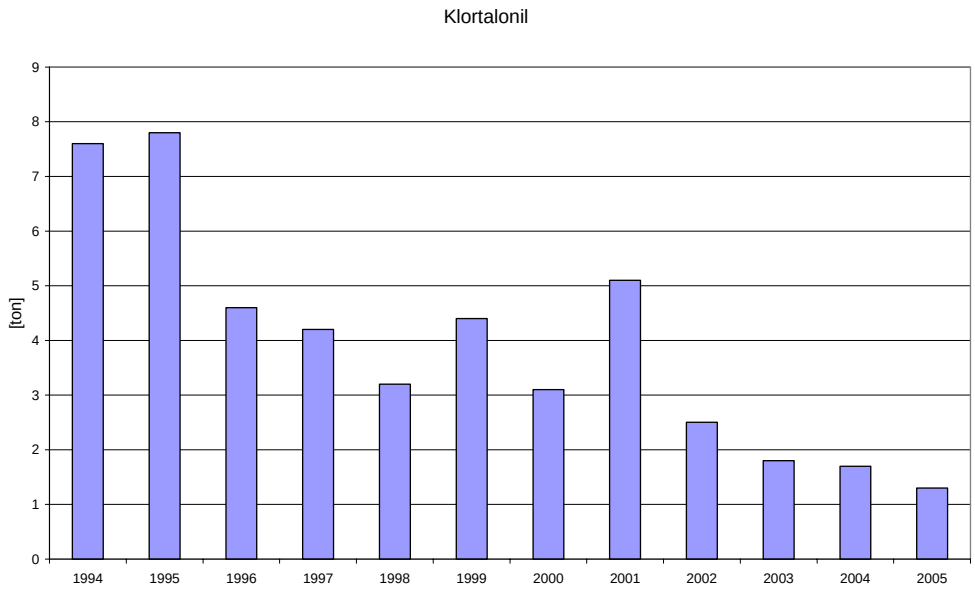
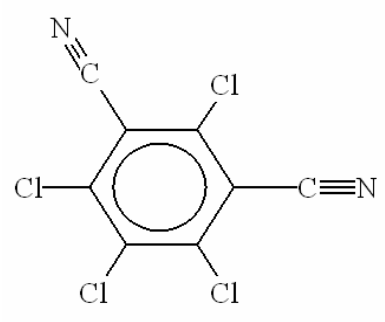


Figure 1.2 Registered amounts of chlorothalonil in Sweden from the year 1994 – 2005

[2] The statistics are based on the amount of pure substance or substance in products that companies have filed to the Swedish Chemicals Agency.

Table 1.2 Physiochemical and (Eco)toxicological properties of chlorothalonil. Source: SWECO (2006)

Common name	**Chlorothalonil**			
				
Name	2,4,5,6-tetrachlorobenzene-1,3-dicarbonitrile			
CAS #	1897-45-6			
Classification	Carc. Cat. 3; R40 T+; R26 Xi; R41 Xi; R37 R43 N; R50-53			
		Min	Max	Unit
Physical and chemical properties	Water solubility	0.6	0.96	mg/l
	Water – organic carbon partition coefficient (K_{oc})	1800	2392	
	Henrys constant	$2*10^{-7}$	$2*10^{-6}$	atm*m^3/mol
	Vapor pressure	$5.7*10^{-5}$	0.098	mmHg
Aquatic ecotoxicology	LC_{50} and EC_{50}	0.0076	0.17	mg/l
	NOEC och LOEC	-	-	mg/l
Terrestrial ecotoxicology	LC_{50} and EC_{50}	650	10 000	mg/kg soil
	NOEC and LOEC	-	-	mg/kg soil
Toxicology (vertebrates, mostly rats and mice).	LD_{50} = 2.5 – 3700 mg/kg			
PBT classification	P+ b T			
Theoretical reduction in waste treatment plants	6.2 %			
Theoretical environmental partitioning	air – 5.45 %, water – 13.15 %, soil – 81.35 %, sediment – 0.077 %			
Guideline values	None found			

1.3.3 Diuron

Diuron has commonly been used as a weed killer on railway embankments, roads, parking lots etc. This usage is now discontinued and its main usage has been as a biocide in water based paints for exterior use and boat paints. It has also been used as a biocide in glues and lacquers used in the engineering industries.

The registered[3] amounts of diuron in Sweden from the year 1992 – 2005 are presented in figure 1.3 below. Physiochemical and (eco)toxicological properties are presented in table 1.3.

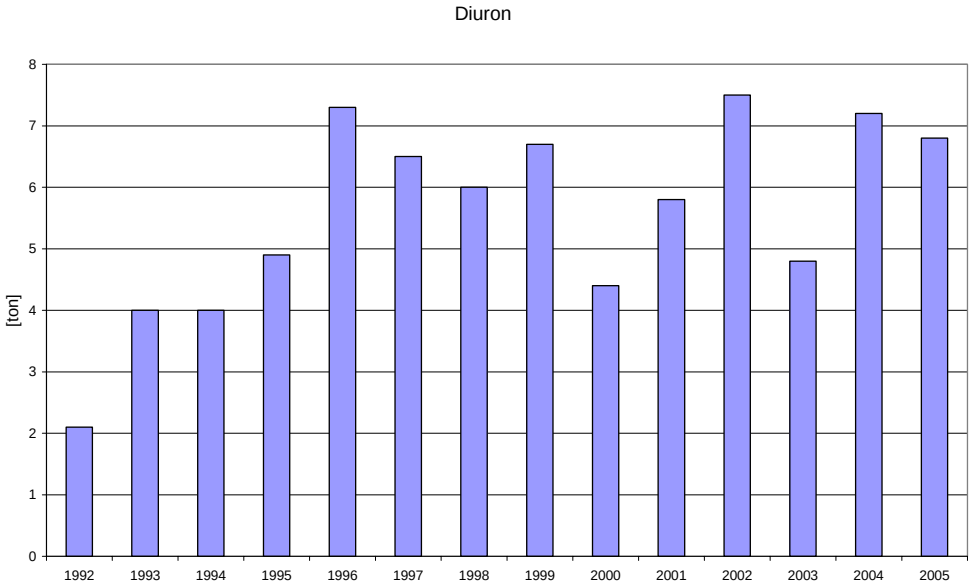
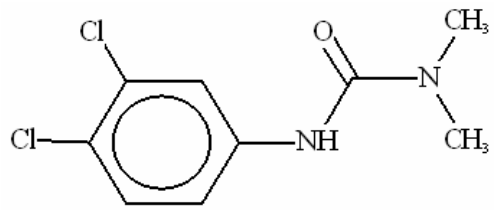


Figure 1.3 Registered amounts of diuron in Sweden from the year 1992 – 2005

[3] The statistics are based on the amount of pure substance or substance in products that companies have filed to the Swedish Chemicals Agency.

Table 1.3 Physiochemical and (Eco)toxicological properties of Diuron. Source: SWECO (2006)

Common name	**Diuron**			
				
Name	3-(3,4-dichlorophenyl)-1,1-dimethyl-urea			
CAS #	330-54-1			
Classification	Carc.3; R40 Xn; R22-48/22 N; R50-53			
		Min	Max	Unit
Physical and chemical properties	Water solubility	35	42	mg/l
	Water – organic carbon partition coefficient (K_{oc})	72	383	
	Henrys constant	$5.04*10^{-10}$	$5.8*10^{-10}$	$Atm*m^3/mol$
	Vapor pressure	$1.7*10^{-10}$	$6.9*10^{-8}$	mmHg
Aquatic ecotoxicology	LC_{50} and EC_{50}	0.0013	0.04	mg/l
	NOEC och LOEC	0.005	1	mg/l
Terrestrial ecotoxicology	LC_{50} and EC_{50}	1000	5000	mg/kg soil
	NOEC and LOEC	-	-	mg/kg soil
Toxicology (vertebrates, mostly rats and mice).	LD_{50} 500 – 1017 mg/kg			
PBT classification	P b T			
Theoretical reduction in waste treatment plants	3.7 %			
Theoretical environmental partitioning	air – 0.00367 %, water – 14.5 %, soil – 85.5 %, sediment – 0.0521 %			
Guideline values	Environmental Quality Standard for one sampling per year[1] AA-EQS: 0.2 µg/L			

[1] According to the EU Water Framework Directive

1.3.4 Cypermethrin

Cypermethrin is used as an insecticide mainly in forestry to control outbreaks of arthropods. It used both during planting of saplings and when felled trees are kept at intermittent sites before transport to lumber industries or paper mills. The usage in forestry in Sweden has increased due to major storms in 2005 and 2006 which felled a very large number of tress that had to be intermittently stored.

Cypermethrin is also commonly used in products used to combat and control ants in gardens and inside buildings.

The registered amounts[4] of cypermethrin in Sweden from the year 1993 – 2005 are presented in figure 1.4 below. Physiochemical and (eco)toxicological properties are presented in table 1.4

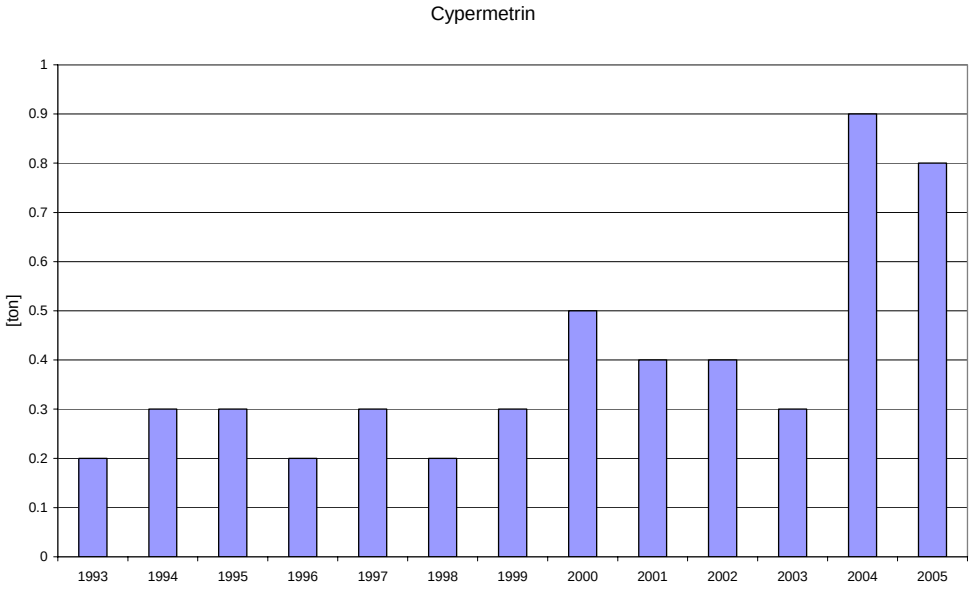
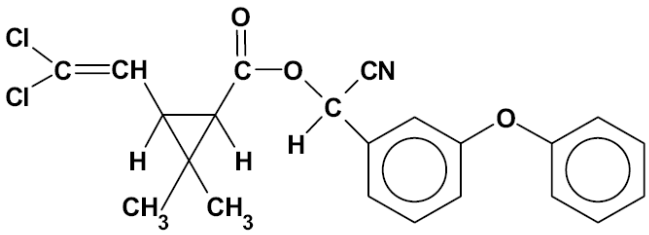


Figure 1.4 Registered amounts of cypermethrin in Sweden from the year 1992 – 2005

[4] The statistics are based on the amount of pure substance or substance in products that companies have filed to the Swedish Chemicals Agency.

Table 1.4 Physiochemical and (Eco)toxicological properties of Cypermethrin. Source: SWECO (2006)

Common name	**Cypermethrin**			
				
Name	[cyano-(3-phenoxyphenyl)methyl] 3-(2,2-dichloroethenyl)-2,2-dimethyl-cyclopropane-1-carboxylate			
CAS #	52315-07-8			
Classification	EU: R: 22-37/38-43-50/53			
		Min	Max	Unit
Physical and chemical properties	Water solubility	0.004	-	mg/l
	Water – organic carbon partition coefficient (K_{oc})	5800	1.6E05	
	Henrys constant	$4.2*10^{-7}$	-	$Atm*m^3/mol$
	Vapor pressure	$3.1*10^{-9}$	$1.7*10^{-7}$	mmHg
Aquatic ecotoxicology	LC_{50} and EC_{50}	$5*10^{-6}$	$3*10^{-5}$	mg/l
	NOEC och LOEC	$1*10^{-5}$	0.0011	mg/l
Terrestrial ecotoxicology	LC_{50} and EC_{50}	2634	3951	mg/kg soil
	NOEC and LOEC	-	-	mg/kg soil
Toxicology (vertebrates, mostly rats and mice).	LD_{50} 24.6 – 400 mg/kg			
PBT classification	P+ b T+			
Theoretical reduction in waste treatment plants	92.39 %			
Theoretical environmental partitioning	air – 0.199 %, water – 12.6 %, soil – 26.05 %, sediment – 61.15 %			
Guideline values	Swedish surface waters[1]: 0.0001 - 0.0002 µg/l MPC soil[2]: 0.39 mg/kg			

[1] The Swedish Chemicals Agency has developed guideline values for pesticides in surface waters. The guideline values represent the highest concentration where no negative ecological effects are expected. These values are not binding and are only meant to assist the interpretation of results from environmental monitoring.

[2] Dutch guideline concentration that supposedly protects 95% of all species in a soil. Based on statistical extrapolations or the use of safety factors applied on ecotoxicological data (RIVM 1997).

1.3.5 Kathon

Kathon is a trademark for a group of biocides that consists of a mix of several (isothiazolon-) compounds.

The present study focuses on Kahon GC (CAS No. 55965-84-9)which is one of the most common kathon mixtures containing 2-methyl-3-isothiazolinone (MI) and 5-chloro-2-methyl-3-isothiazolinone (CMI).

These isothiazolinones are mainly used as preservatives for the control of microorganisms (fungi and bacteria) in aqueous-based industrial products such as cleaning agents and in cosmetics, toiletries and household products such as shampoos, other hair and skin care products, fabric softeners or polishes (Madsen et al. 2001, Rafoth et al.2007). They are also widely used as slemicides in pulp and paper industries.

The cosmetic industry employs a 3:1 CMI/MI mixture as Kathon. In cosmetic products the maximum allowed concentration is 15 ppm of the mixture of MI and CMI (Directive 97/18/EC and Directive 98/16/EC). The products may include water at levels more than 75% and various kinds of salts, e.g. magnesium salts. Examples of commercial products are Kathon CG (cosmetic grade): 0.35% MI and 1.15% CMI = 1.5% active ingredients + magnesium salts, and Kathon 886: 3.8% MI and 10.1% CMI = 13.9% active ingredients.

The registered amounts[5] of kathon in Sweden from the year 1993 – 2005 are presented in figure 1.5 below. Physiochemical and Ecotoxicological properties are presented in table 1.5.

[5] The statistics are based on the amount of pure substance or substance in products that companies have filed to the Swedish Chemicals Agency.

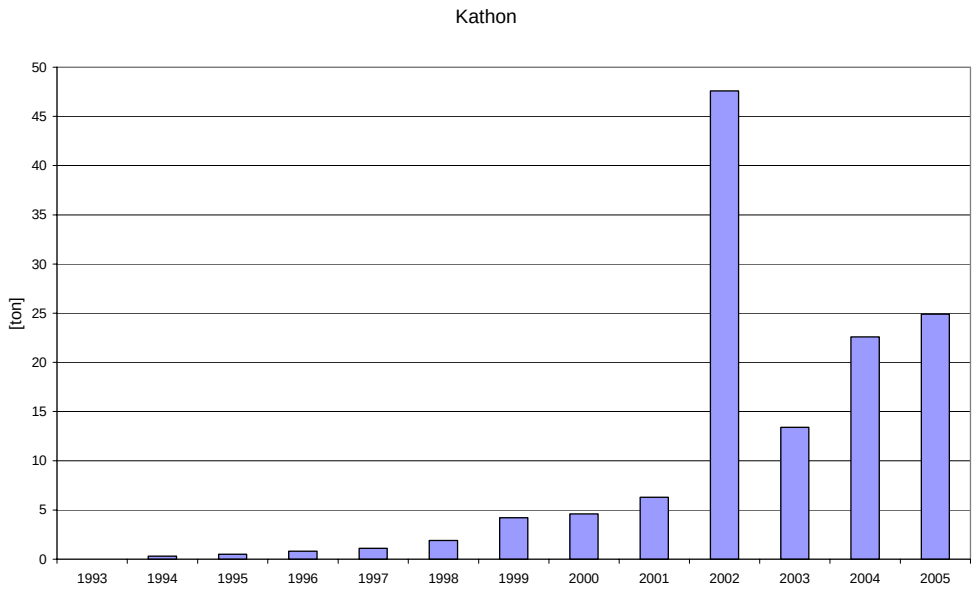
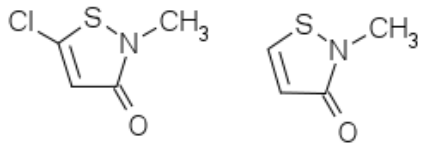


Figure 1.5 Registered amounts of kathon in Sweden from the year 1993 – 2005

Table 1.5 Physiochemical and (Eco)toxicological properties of Kathon. Source: SWECO (2006)

Common name	**Kathon**			
3:1 mixture 				
Name	5-chloro-2-methyl-2 H -isothiazol-3-one (CMI) 2-methyl-2 H -isothiazol-3-one (MI)			
CAS #	55965-84-9 (mixture) 26172-55-4; 2682-20-4			
Classification	T; R23/24/25 C; R34 R43 N; R50-53			
		Min	Max	Unit
Physical and chemical properties	Water solubility	235 650	536 700	mg/l
	Water – organic carbon partition coefficient (K_{oc})	27.88	45.15	
	Henrys constant	$2.14*10^{-8}$	$2.92*10^{-8}$	$atm*m^3/mol$
	Vapor pressure	0.0054	0.031	mmHg
Aquatic ecotoxicology	LC_{50} and EC_{50}	-	-	mg/l
	NOEC och LOEC	16.5	166	mg/l
Terrestrial ecotoxicology	LC_{50} and EC_{50}	-	-	mg/kg soil
	NOEC and LOEC	-	-	mg/kg soil
Toxicology (vertebrates, mostly rats and mice).	LD_{50} 53 – 60 mg/kg			
PBT classification	p b T			
Theoretical reduction in waste treatment plants	1.85 %			
Theoretical environmental partitioning	air – 0.116 %, water – 65.9 %, soil – 33.9 %, sediment – 0.0393 %			
Guideline values	-			

1.3.6 Propiconazole

Propiconazole is a fungicide used for example in cereal crops and grass seed cultivations. It is also used as a fungicide at golf courses. Within this project a number of green keepers at golf courses were interviewed. From the interviews it appears that this usage is very rare in Sweden.

Furthermore, propiconazole is a common fungicide in a number of paint and wood oil products for exterior use. Its function is to prevent the forming of mould during storage and underneath the painted surface.

The registered amounts[6] of propiconazole in Sweden from the year 1992 – 2005 are presented in figure 1.6 below. Physiochemical and (Eco)toxicological properties are presented in table 1.6

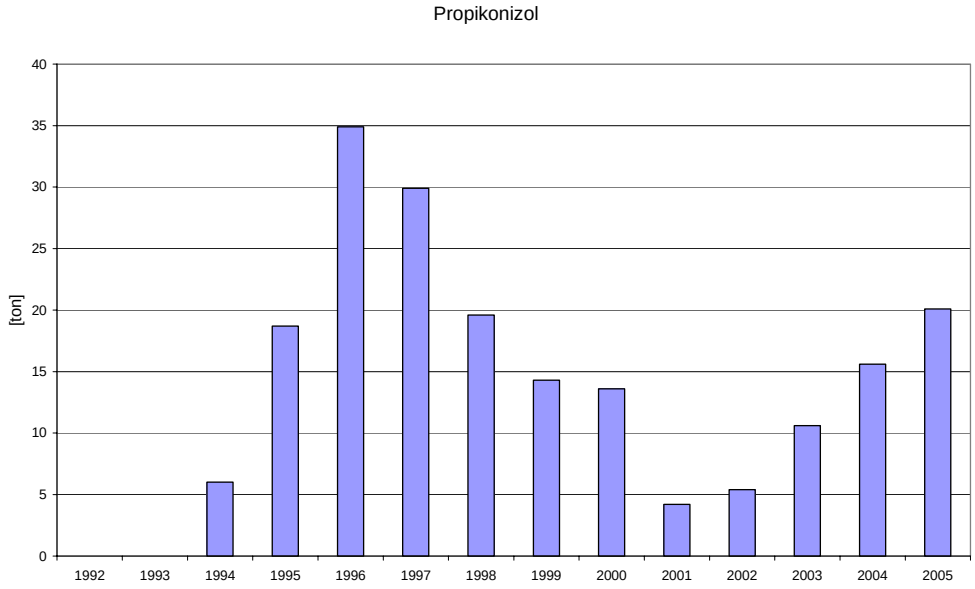
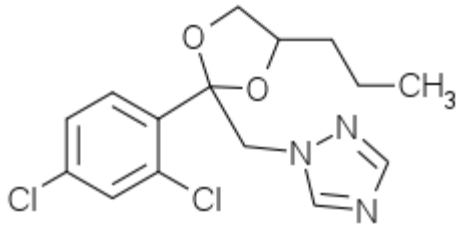


Figure 1.6 Registered amounts of Propiconazole in Sweden from the year 1992 – 2005

[6] The statistics are based on the amount of pure substance or substance in products that companies have filed to the Swedish Chemicals Agency.

Table 1.6 Physiochemical and (Eco)toxicological properties of Propiconazole. Source: SWECO (2006)

Common name	**Propiconizole**			
				
Name	1-((2-(2,4-Dichlorophenyl)-4-propyl-1,3-dioxolan-2-yl)methyl)-1H-1,2,4-triazole			
CAS #	60207-90-1			
Classification	Xn; R22 R43 N; R50-53			
		Min	Max	Unit
Physical and chemical properties	Water solubility	100	110	mg/l
	Water – organic carbon partition coefficient (K_{oc})	1 900	5 564	
	Henrys constant	$4.1*10^{-9}$	$4.12*10^{-9}$	$atm*m^3/mol$
	Vapor pressure	$1*10^{-6}$	-	mmHg
Aquatic ecotoxicology	LC_{50} and EC_{50}	$7*10^{-4}$	0.72	mg/l
	NOEC och LOEC	0.5	3	mg/l
Terrestrial ecotoxicology	LC_{50} and EC_{50}	5 620	-	mg/kg soil
	NOEC and LOEC	-	-	mg/kg soil
Toxicology (vertebrates, mostly rats and mice).	LD_{50} 1 517 – 4 000 mg/kg			
PBT classification	P b T			
Theoretical reduction in waste treatment plants	19.08 %			
Theoretical environmental partitioning	air – 0.0607 %, water – 8.65 %, soil – 91.1 %, sediment – 0.207 %			
Guideline values	Swedish surface waters[1]: 7 µg/l			

[1] The Swedish Chemicals Agency has developed guideline values for pesticides in surface waters. The guideline values represent the highest concentration where no negative ecological effects are expected. These values are not binding and are only meant to assist the interpretation of results from environmental monitoring.

2 Methodology

2.1 Sampling Strategy

A national sampling strategy was devised based on two objectives:

- Elucidate the main sources of these substances to the environment
- Elucidate the levels of these substances in the environment

The different matrices chosen and the specific sampling strategy for each substance are presented in the following sections. Environmental background levels in surface water, fish (diuron only) and sediments were determined in samples from regional background reference lakes where the influence from human activities are considered to be minimal in a regional context; Abiksojaure in the northernmost part of Sweden, Ljusacksen in the middle part of Sweden and Krageholmsjön in the southernmost part of Sweden (Figure 2.1). Soil was also sampled from the areas around these lakes.

Figure 2.1 Background sampling stations

2.1.1 Tolylfluanid

The most important sampling within the national screening were:

Forest seedling nurseries where the substance was used until 2006/2007. Samples were taken both in soil and in drainage water.

Paint industries were the substance is still used as a biocide. Two smaller paint industries and one very large was included. Samples were taken in soil, sludge from an on-site treatment plant (the larger industry), incoming water to the treatment plant, storm water, ground water and sediments.

Landfills receiving painted and impregnated building material. Three large landfills in southern Sweden were included in the study and samples were also taken in

surface waters and sediments influenced by the landfills and in storm water within the landfill.

Agriculture where the substance has been used as a fungicide. Soil, ground water, surface water, and sediments were sampled.

Storage sites where painted and/or impregnated wood is stored outdoors. Samples were mostly taken in storm water and storm water sediments.

Soils below outdoor building surfaces that had been painted with a paint product that contained 0.2% of tolylfluanid. This was to test whether tolylfluanid leached from these surfaces to the soil below.

Originally, foodstuffs (vegetables) were included in the sampling plan. The extent of this sampling was reduced since this substance is measured routinely in vegetables by the Swedish National Food Administration. Also, the number of sites for sampling where small boats are stored during winter (marinas) were reduced since a literature survey revealed that no boat paints on the Swedish market contain this substance.

Within the regional screening programme, this substance was mostly measured at water treatment plants.

The sampling plan and the measured matrices are shown in table 2.1.

Table 2.1 Sampling matrices and the types of sources for tolylfluanid. The first value denotes samples taken within the national screening programme. The second value (after the slash) denotes samples financed by the regional screening programme.

Sampling matrices Tolylfluanid										
Sources	Soil	Sludge	Incoming water	Out-going water	Surface water	Storm water	Landfill leachate	Groundwater	Sediment	Foodstuff
Background	3 / 0				2 / 0				3 / 0	
Diffuse sources					1 / 1				1 / 0	
Waste water treatment plants		3 / 1	1 / 1	3 / 2						
At a locations influenced by the following sources										
a. Waste water treatment plants					2 / 2				1 / 0	
b. Paint industry	1 / 0	1 / 0	1 / 0			4 / 0		2 / 0	3 / 0	
c. Harbours	1 / 0							1 / 0		
d. Agriculture	2 / 0				2 / 0			2 / 0	2 / 0	4 / 0
e. Landfills					1 / 0		11 / 2		1 / 0	
f. Painted surfaces, outdoors	8 / 0									
g. Forest seedling nurseries	6 / 0					1 / 0		1 / 0		
h. Storage sites for impregnated wood	2 / 0					1 / 0			5 / 0	
Total	23 / 0	4 / 1	2 / 1	3 / 2	7 / 3	6 / 0	11 / 2	6 / 0	15 / 0	4 / 0
Grand total						**80 / 9**				

2.1.2 Chlorothalonil

The most important sampling within the national screening were:

Paint industries were chlorothalonil was previously used. Two smaller paint industries and one very large was included. Samples were taken in soil, sludge from an on-site treatment plant (the larger industry), incoming water to the treatment plant, storm water, groundwater and sediments.

Landfills receiving painted and impregnated building material. Three large landfills in southern Sweden were included in the study and samples were taken in surface waters and sediments influenced by the landfills and in run-off water within the landfill.

Storage sites where painted and/or impregnated wood is stored outdoors. Samples were mostly taken in storm water and storm water sediments.

Marinas where boats are kept at land during winter. Chlorothalonil is used in boat paint that can be bought outside of Sweden. Also, when testing a number of environmentally friendly boat paints used on the western coast of Sweden, it was found that one contained 10% chlorothalonil without any information on the paint label[7].

The regional sampling of chlorothalonil was sparse and focused mostly on sewage treatment plants.

The sampling plan and the measured matrices is shown in table 2.2

Table 2.2 Sampling matrices and the types of sources for chlorothalonil. The first value denotes samples taken within the national screening programme. The second value (after the slash) denotes samples financed by the regional screening programme.

Sampling matrices chlorothalonil									
Sources	Soil	Sludge	Incoming water	Outgoing water	Surface water	Storm water	Landfill leachate	Ground-water	Sediment
Background	3 / 0				2 / 1				3 / 0
Diffuse sources					1 / 2				1 / 0
Waste water treatment plants		3 / 1	1 / 1	3 / 2					
At a locations influenced by the following sources									
a. Waste water treatment plants					1 / 2				1 / 0
b. Paint industries		1 / 0	1 / 0			3 / 0		2 / 0	3 / 0
c. Harbors / boat storage sites	2 / 0							1 / 0	
d. Agriculture	2 / 0				2 / 0			2 / 0	2 / 0
e. Landfills					1 / 0		11 / 2		1 / 0
f. Forest seedling nurseries								1 / 0	
g. Storage sites for treated wood	2 / 0					1 / 0			4 / 0
Total	7 / 0	4 / 1	2 / 1	3 / 2	7 / 5	4 / 0	11 / 2	6 / 0	15 / 0
Grand total	**59 / 11**								

[7] Mindre Gift på Drift. Länsstyrelsen Västra Götaland Rapport nr 1999:37. Rapport från Kemikalieprojektet inom ramen för Skärgårdsuppdraget.

2.1.3 Diuron

The most important sampling within the national screening were:

Paint industries were the substance is still used as a biocide. Two smaller paint industries and one very large was included. Samples were taken in soil, sludge from an on site treatment plant (the larger industry), incoming water to the treatment plant, storm water, ground water and sediments

Landfills receiving painted and impregnated building material. Three large landfills in southern Sweden were included in the study and samples were taken in surface waters and sediments influenced by the landfills and in storm water within the landfill.

Storage sites where painted and/or impregnated wood is stored outdoors. Samples were mostly taken in storm water and storm water sediments.

Railway yards and railway embankments where diuron has been used as a weed killer.

The regional sampling of chlorothalonil was sparse and focused mostly on water treatment plants.

The sampling plan and the measured matrices is shown in table 2.3

Table 2.3 Sampling matrices and the types of sources for diuron. The first value denotes samples taken within the national screening programme. The second value (after the slash) denotes samples financed by the regional screening programmes.

Sampling matrices Diuron										
Sources	Soil	Sludge	Incoming water	Outgoing water	Surface water	Storm water	Landfill leachate	Ground–water	Fish	Sediment
Background	3 / 0				1 / 1				3/0	3 / 0
Diffuse sources										
Waste water treatment plants		2 / 3	1 / 1	1 / 3						
At a locations influenced by the following sources										
a. Waste treatment plants					1 / 1					1 / 0
b. Paint industries		1 / 0	1 / 0			3 / 0		2 / 0		
c. Harbors / boat storage sites	3 / 0							1 / 0		6 / 0
d. Railway yards / embankments					2 / 0			6 / 0		1 / 0
e. Landfills						3/0	6 / 0			
g. Storage sites for treated wood	2 / 0					1 / 0				4 / 0
Total	8 / 0	3 / 3	2 / 1	1 / 3	4 / 2	7 / 0	6 / 0	9 / 0	3/0	15 / 0
Grand total	**57 / 9**									

2.1.4 Cypermethrin

The most important sampling sites were:

Forest seedling nurseries where cypermethrin is used to protect newly planted seedlings against arthropod infestation.

Intermittent storage sites for timber where cypermethrin is used to protect newly felled timber against outbreaks of arthropods.

Storm water from detached houses and villa gardens because the usage of pesticide products containing cypermethrin may result in these compounds reaching the storm water system.

Landfills receiving painted and impregnated building material. Three large landfills in southern Sweden were included in the study and samples were taken in surface waters and sediments influenced by the landfills and in storm water within the landfill.

The sampling plan and the measured matrices is shown in table 2.4.

Table 2.4 Sampling matrices and the types of sources for Cypermethrin. The first value denotes samples taken within the national screening programme. The second value (after the slash) denotes samples financed by the regional screening programme.

Sampling matrices Cypermethrin

Sources	Soil	Sludge	Incoming water	Outgoing water	Surface water	Storm water	Sediments from storm water manhole	Landfill leachate	Ground-water	Sediment
Background	3 / 0				2 / 0					3 / 0
Diffuse sources					1 / 1					
Waste water treatment plants		0 / 1	2 / 1	4 / 3						
At a locations influenced by the following sources										
a. Waste water treatment plants					1 / 2					1 / 0
Detached house gardens	3/0									
b. Storm water from detached houses						7 / 0				
c. Forest seedling nurseries	1 / 0				2 / 0				2 / 0	2 / 0
d. Storage sites for timber	32 / 0									
e. Landfills					1 / 0			11 / 0		1 / 0
f. Paint industries		1 / 0	1 / 0			3 / 0	3 / 0		2 / 0	0 / 1
g. Harbours / boat storage sites									1 / 0	
h. Agriculture	2 / 0				2 / 0				2 / 0	2 / 0
i. Storage sites for treated wood	2 / 0					1 / 0	5 / 0		1 / 0	
Total	40 / 0	1 / 1	3 / 1	4 / 3	9 / 3	11/0	8 / 0	11 / 0	8 / 0	9 / 1
Grand total	**103 / 11**									

2.1.5 Kathon

The most important sampling sites were:

Paint industries were the substance is still used as a biocide. Two smaller paint industries and one very large was included. Samples were taken in soil, sludge from an on site treatment plant (the larger industry), incoming water to the treatment plant, storm water, ground water and sediments.

Waste water treatment plants that receives waste water from a number of possible sources where the substance is used, including household usage and industrial usage.

Pulp and paper industries where Kathon is used as a slemicide to prevent microbial growth on machine equipment.

Single house sewage plants where water from single houses is treated in sand filters before reaching surface waters.

The original sample plan included sites impacted by production of household products. No such production site where Kathon was used was found in Sweden. These were replaced by paint industries and pulp and paper industries.

Regional sampling of kathon focused almost exclusively on sewage treatment plants.

The sampling plan and the measured matrices are shown in table 2.5.

Table 2.5. Sampling matrices and the types of sources for kathon. The first value denotes samples taken within the national screening programme. The second value (after the slash) denotes samples financed by the regional screening programme.

Sampling matrices Kathon										
Sources	Soil	Sludge	Incoming water	Outgoing water	Surface water	Storm water	Sediments from storm water manhole	Landfill leachate	Ground water	Sediment
Background	3 / 0									3 / 0
Diffuse sources					1 / 3	3 / 0				0 / 1
Waste water treatment plants		2 / 23	2 / 13	2 / 36						
At a locations influenced by the following sources										
a. Waste water treatment plants					2 / 4				1 / 0	2 / 1
b. Singe house sewage plants		1 / 0		3 / 0					2 / 0	1 / 0
e. Landfills						0 / 1		0 / 1		1 / 0
f. Pulp and paper industries		3 / 0	4 / 0	3 / 0	1 / 0					3 / 0
f. Paint industries		1 / 1	1 / 0	1 / 1		1 / 0	3 / 0		2 / 0	2 / 0
h. Hospitals				0 / 2						
i. Storage sites for treated wood							2 / 0			1 / 0
j. Household						3 / 0			1 / 0	
Total	3 / 0	7 / 24	7 / 13	9 / 39	4 / 7	7 / 1	5 / 0	0 / 1	6 / 0	13 / 2
Grand total	**54 / 87**									

2.1.6 Propiconazole

The most important sampling sites were:

Storage sites where painted and/or impregnated wood is stored outdoors. Samples were mostly taken in storm water and storm water sediments.

Landfills receiving painted and impregnated building material. Three large landfills in southern Sweden were included in the study and samples were taken in surface waters and sediments influenced by the landfills and in storm water within the landfill.

Paint industries were the substance is still used as a biocide. Two smaller paint industries and one very large was included. Samples were taken in soil, sludge from

an on-site treatment plant (the larger industry), incoming water to the treatment plant, storm water, ground water and sediments.

Originally, the sample plan included golf courses. These were however excluded since no golf courses where this substance is used could be found.

The sampling plan and the measured matrices is shown in table 2.6.

Table 2.6 Sampling matrices and the types of sources for propiconazole. The first value denotes samples taken within the national screening programme. The second value (after the slash) denotes samples financed by the regional screening programme.

Sampling matrices Propiconazole										
Sources	Soil	Sludge	Incoming water	Outgoing water	Surface water	Storm water	Sediments from storm water manhole	Landfill leachate	Ground-water	Sediments
Background	3 / 0				1 / 0					3 / 0
Diffuse sources					1 / 2					1 / 0
Waste water treatment plants		3 / 4	2 / 1	5 / 2						
At a locations influenced by the following sources										
a. Agriculture	2 / 0				2 / 0				2 / 0	2 / 0
b. Storage sites for treated wood	2 / 0				2 / 0	1 / 0	5 / 0		1 / 0	4 / 0
c. Forest seedling nurseries									1 / 0	
d. Landfills					1 / 0			11 / 2		1 / 0
e. Waste water treatment plants					1 / 1					1 / 0
gf. Paint industries		1 / 0	1 / 0			3 / 0	3 / 0		2 / 0	0 / 1
g. Harbours / boat storage sites									1 / 0	
h. Household						2 / 0				
Total	7 / 0	4 / 4	3 / 1	5 / 2	8 / 3	6 / 0	8 / 0	11 / 2	7 / 0	12 / 1
Grand total	71 / 13									

2.2 Sampling methods

Sampling instructions were given to all sampling personnel. The instructions explained sampling procedures and handling of samples during transport.

2.2.1 Soil

Soil was sampled from the topmost layer after the removal of dead and living plant parts. Also, stones and larger objects were avoided. Soil samples were collected into diffusion proof clean sampling plastic bags and sent to the laboratory within a day of sampling. Samples were kept cold until analysis.

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2.2.2 Sediment

Sediment samples were collected by means of a core sampler. All sediment samples were transferred to pre burned and dark glass jars and sent to laboratory within one or two days of collection. They were stored cold until analysis.

2.2.3 Sewage Treatment Plant (STP) sludge and water

The staff at the sewage treatment plants collected the sludge samples and water samples in acid rinsed pre burned dark glass bottles. All STP samples were sent to the laboratory within one or two days of collection. They were stored cold until analysis.

2.2.4 Fish

Only perch (*Perca fluviatilis*) was used in this study. Samples from Abisakojaure and Krageholmssjön were supplied from the Environmental Specimen Bank at the Museum of Natural history (A. Bignert and colleagues). Fish from Ljusacknen and all other fish were collected using fishing net. All fish samples were stored frozen until analysis.

2.2.5 Water

Unfiltrated water was collected in clean in acid rinsed pre-burned dark glass bottles. Water samples were cold until analysis.

2.3 Analytical methods

Analytical methods are given in table 2.7 below.

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Table 2.7 Analytical methods for the substances investigated in the screening study.

Substance	Extraction	Cleanup	Internal standard	External standard	Instrument	Method
Tolylfluanide solid matrices	Hexane/ Cyclohexane/ Acetone	No	3	Tolyfluanide	GC-MS	Internal
Tolylfluanide water	Direct injection	No	3	3	LC-MS-MS	internal
Chlorothalonil	Dichloromethane, pH2 and pH 10	No	3	Chlorothalonil	GC-MS	Modified EN-12918
Diuron water	Direct injection	No	3	3	LC-MS-MS	internal
Diuron solid matrices	Acetonitrile		Fenuron and Prometryn in MeOH	Diuron	LC-DAD	Internal
Cypermethrin	Hexane/ Cyclohexane/ Acetone	No	no	Cypermethrin	GC-MS	Internal
Propiconazole	Dichloromethane, pH2 and pH 10	No	no	Propiconazole	GC-MS	Modified EN-12918
Kathon	Mixture of polar solvents	SPE in solid matrices	3	Kathon	GC-MS	Internal

3 Results and discussion

3.1 Tolylfluanid

Tolylfluanid was detected in the sediments of two storm water manholes at a paint industry (0,26 and 0,85 mg/kg) and in soil (0,3 mg/kg) at a storage site for treated wood. The limit of quantification in water was 0.01 – 10 µg/l and 0.01 – 0.1 mg/kg in soils and sediments.

Previous studies regarding the degradability and volatility in soils, sediment and surface waters indicate that tolylfluanid rapidly hydrolyses in the environment (http://www.apvma.gov.au/publications/prstol.shtml, EFSA 2005) which could be the major explanation for the low degree of detection in this study.

The main metabolite of tolylfluanid is dimethylaminosulfotoluidide which has a similar toxicity compared to tolylfluanid but a lower mobility. This substance has been found in soil extracts on a few occasions (Roberts and Hutson 1998).

Recently (2007) a previously unknown degradation product (dimethylsulfamide) of tolylfluanid has been discovered (http://www.kemi.se/SiteSeeker/HitCounter.aspx?url=http%3a%2f%2fwww.kemi.se%2fupload%2fBekampningsmedel%2fEuparen_aterkallande_av_godkannandet.pdf&pageid=4694.1&word=tolylfluanid). This degradation product can in turn form nitrosamines when drinking water is treated with ozone. Since nitrosamines are known carcinogenics and German authorities have found dimethylsulfamide in both surface water and groundwater, the usage of tolylfluanide in open field agriculture has been revoked in the European Union. The usage at forest seedling nurseries had consequently been discontinued for at least a year before the measurements in this study were done which may be one more reason why tolylfluanide was not detected.

However, tolylfluanide is still used in paint formulations. The substance was detected in two samples of sediments from storm water manholes at a paint industry where tolylfluanide is used daily. No tolylfluanide was detected in the storm water, groundwater , untreated waste water, sludge from waste water treatment or soil samples collected at paint industries.Soils below building facades that had been painted 1 – 2 years ago with paint that contained 0.2% of tolylfluanide did not contain any measurable concentrations of tolylfluanide.

Previous studies show that tolylfluanide leach from freshly painted surfaces at a rate of 0.4% / 100 days (Togerö 2004). This indicates that the leaching should have been ongoing. The lack of detection below painted surfaces may be because the rate of

leaching from the facade is slower than the rate of degradation in the soil, or that the concentrations in the soil do not become high enough for detection to be possible.

Tolylfluanide is regularly sampled within the regional monitoring of pesticides (table 3.1). The substance has never been detected within these sampling programs.

Table 3.1 Monitoring data for Chlorothalonil from regional and local monitoring of pesticides in surface waters, ground waters and drinking waters. The database is maintained by the Swedish Agricultural University with financing from the Swedish Environmental protection Agency. All data is supplied from regional monitoring of pesticides. http://vv.mv.slu.se/.

	Years	Number of analyses	Number of occasions when detected	Median concentration	Maximum concentration
Ground water (µg/l)	Before 1990 - 1997	265	0	0	0
	1998 - 2007	199	0	0	0
Surface water (µg/l)	Before 1990 - 1997	630	0	0	0
	1998 - 2007	86	0	0	0
Drinking water (µg/l)	Before 1990 - 1997	149	0	0	0
	1998 - 2007	52	0	0	0

Conclusions and recommendations

On the one hand, tolylfluanide was found on two occasions in connection to a major point source (a paint industry). On the other hand, tolylfluanide was not encountered in a large number of other matrices and is not detected within the ongoing monitoring performed by the Swedish Agricultural University. Consequently, there is no further need for screening or monitoring of tolylfluanide. The information on degradation products in German surface waters and ground waters needs to be reviewed to determine whether a limited screening of these degradation products are necessary or not.

3.2 Chlorothalonil

Chlorothalonil was not detected in any of the samples. The limit of quantification in water was 0.01 – 10 µg/l and 0.01 – 0.1 mg/kg in soils and sediments.

The usage of chlorothalonil within agriculture has been discontinued for a long time (end of the 1990s) due its carcinogenic effects. It is still used in paint and wood preservation products (most likely at very low concentrations). Despite this, no chlorothalonil was found at paint factories or where treated wood products are stored. The low concentrations used in paint and products for wood treatment may mean that the usage is “diluted” to such a degree that the substance is difficult to detect in the environment.

Another reason for the lack of detection may be that biodegradation is expected to be an important fate process both in water and soils (HSDB). Chlorothalonil biodegrades mainly through dechlorination yielding isophthalonitrile degradation products and there are indications that these may be more stable in the environment than the mother compound (HSDB). Hydrolysis only occurs at pH > 7 and it is uncertain how important this process is for the environmental fate of chlorothalonil.

Chlorothalonil is expected to have low mobility in soils based on Koc values in the range of 1800 to 2400 (Table 1.2). Consequently, the transport to surface waters and/or ground waters should be very limited.

Apart from the low usage, this may also explain why chlorothalonil has not been found within the Swedish regional aquatic monitoring of pesticides (table 3.2)

Table 3.2 Monitoring data for Chlorothalonil from regional and local monitoring of pesticides in surface waters, ground waters and drinking waters. The database is maintained by the Swedish Agricultural University with financing from the Swedish Environmental protection Agency. All data is supplied from regional monitoring of pesticides. http://vv.mv.slu.se/.

	Years	Number of analyses	Number of occasions when detected	Median concentration	Maximum concentration
Ground water (µg/l)	Before 1990 - 1997	194	0	0	0
	1998 - 2007	38	0	0	0
Surface water (µg/l)	Before 1990 - 1997	616	0	0	0
	1998 - 2007	8	0	0	0
Drinking water (µg/l)	Before 1990 - 1997	116	0	0	0
	1998 - 2007	19	0	0	0

Conclusions and recommendations

There is no further need for screening or monitoring of chlorothalonil. There is no information in the literature that the degradation products may constitute serious environmental problems which in combination with the low (and decreasing usage – figure 1.2) suggests that the metabolites are not of any concern for future screening either.

3.3 Diuron

Diuron was detected in 15 samples from paint industries, landfills, a storage site for treated wood and waste water treatment plants. Diuron was also found in sediment and water from reference lakes. The results are presented in table 3.3 below. The limit of quantification in water was 0.02 – 0.04 µg/l and 0.01 – 0.05 mg/kg in soils and sediments.

Table 3.3 Samples where diuron has been detected

Source	Matrix	Number of samples	Result
Paint industry	Storm water	2	0.05 - 0.21 µg/l
Paint industry	Groundwater	2	0.06 - 0.4 µg/l
Paint industry, waste water treatment plant	Incoming water	1	32 µg/l
Paint industry, waste water treatment plant	Sludge	1	284 mg/kg DM
Landfill	Leachate	3	0.05 - 0.09 µg/l
Background lake (abiskojaure)	Surface water	1	0.02 µg/l
Background lake (Krageholmssjön)	Sediment	1	0.086 mg/kg DM
Background area (Krageholmssjön)	Soil	1	0.015 mg/kg DM
Waste water treatment plant	Sludge	1	0.063 mg/kg DM
Waste water treatment plant	Surface water	1	0.02 µg/l
Storage for treated wood	Storm water sediment	1	0.0188 mg/kg DM

Diuron was detected in three samples from two of the background locations; in the water of Abiskojaure, in sediments of Krageholmssjön and in soil from the area around Krageholmssjön. Krageholmssjön is situated in a agricultural area and the findings may be because of earlier agricultural use, especially considering that no railway embankments or major roads are in the vicinity of the lake. It is probably not easy to find background lakes that are not exposed to any agricultural chemicals in the agricultural areas of southern Sweden, and it is not a major surprise to find diuron in Krageholmssjön.

The findings of diuron in lake water of Abiskojaure are more surprising given that this lake is situated in a very unpopulated area of Northern Sweden. Two explanations are possible. Firstly, there is a major railway within 4 km of the lake and the Diuron found may reflect earlier use at the railway embankments. The other possible explanation is national or global atmospheric transport of diuron through the atmosphere to northern regions. Earlier studies in France (Scheyera et al. 2007) showed that nearly all rain water samples contained diuron. This demonstrates that diuron is probably a common substance in atmospheric deposition.

The usage of diuron on railway embankments and roads sides has been discontinued for a long time since diuron was banned in plant protection products due to its classification as a carcinogenic compound. It is however still widely used in USA. One reason for its popularity as a weed killer is its long residual activity, a quality that has also led to it being a groundwater contaminant of concern (Cederlund m.fl.

2007). A compilation of data from investigations at railway embankments or railway station areas by the Swedish Railway Administration showed that diuron was found at approximately 1/3 of the sampled locations. It should be noted that several of these investigations were focused on delineating the extent of known diuron pollution which indicates that the rate of occurrence was severely overestimated. The number of samples close to railway embankments in the present study may have been to low to “find” diuron at these types of locations.

However, since the occurrence at railway embankments is a known phenomenon this screening focused more on other sources related to the fact that diuron has been used in paint and wood protection products.

Diuron was detected both in the incoming waste water and in sludge from the waste water treatment plant at the paint industry. The effluent was not sampled. Three storm water manholes at the site were sampled for water and sediments. Diuron was detected in two of these water samples but not in any of the sediment samples. Diuron was also detected in two groundwater samples from the paint industry. It is interesting that other biocides investigated within this screening study (propiconazole and tolylfluanide) with a much higher usage in the paint factory were not detected to the same degree at the site. The explanation is probably a much higher persistence of Diuron compared to tolylfluanide and propiconazole.

Diuron was detected in surface waters downstream a waste water treatment plant, but not in the upstream sample. It was also detected in sludge from another waste water treatment plant. Diuron was previously measured in sludge from 6 different waste water treatment plants in Sweden (Kylin 2005) but was not found in any of them. The stream where diuron was found mainly flow through agricultural areas, and diuron has been found in these types of streams before (table 3.4). However, since no diuron was found upstream of the waste water treatment plant it is possible that the plant was the source.

Finally, diuron was detected in three samples from two landfill sites that both received painted and treated wood which is the most likely source of diuron in the landfill leachates.

Diuron is a persistent herbicide with a low degree of biodegradability (HSDB, Cederlund et al 2007) which is probably the most important reason for its reoccurring detection in a number of matrices. However, most of the occurrences were in the vicinity of a major point source (a paint factory) and in many cases it was not detected at all. The proposed environmental quality standard of Diuron according to the water framework directive is 0.2 µg/l. In relevant environmental matrices (which exclude incoming water and solid matrices) this level was exceeded in one groundwater sample and in one storm water sample. Dilution processes will

probably ensure that the EQS value is not exceeded in any surface water that is connected to the storm water and ground water.

Diuron is regularly sampled within regional monitoring of pesticides (table 3.4). Diuron has been found in 0.2-1% of the cases and the occurrence has not diminished when comparing the periods 1990 – 1997 and 1998 - 2008 despite the fact that its use as a weed killer was discontinued in the early 1990s.

Table 3.4 Monitoring data for Diuron from regional and local monitoring of pesticides in surface waters, ground waters and drinking waters. The database is maintained by the Swedish Agricultural University with financing from the Swedish Environmental protection Agency. All data is supplied from regional monitoring of pesticides. http://vv.mv.slu.se/.

	Years	Number of analyses	Number of occasions when detected	Median concentration	Maximum concentration
Ground water (µg/l)	Before 1990 - 1997	221	2	1.03	2.0
	1998 - 2007	3714	16	0.0855	0.2
Surface water (µg/l)	Before 1990 - 1997	518	0	0	0
	1998 - 2007	1064	11	0.0485	0.2
Drinking water (µg/l)	Before 1990 - 1997	125	0	0	0
	1998 - 2007	2530	5	0.1	0.16

Conclusions and recommendations

Diuron is intermittently measured by other national and regional authorities at those types of locations where the substance may occur (especially railway embankments) and yearly in streams, surface waters and groundwater. Consequently, there is no need for further screening of diuron in abiotic matrices. However, it may be pertinent to redesign the regional monitoring of pesticides to include non-agricultural sites since diuron should be viewed as an industrial/product biocide more than an agricultural biocide. Given the indications that Diuron is spreading to more remote areas, a limited screening study of diuron in biotic matrices may be warranted. Such a study could use material from the environmental specimen bank at the department of contaminant research, Swedish museum of natural history to study both the levels in biota at present and in older samples to ascertain if the concentrations are declining or not. Finally, diuron levels in atmospheric deposition and in air may need to be screened to evaluate the atmosphere as an important source of this substance to Swedish surface waters. .

3.4 Cypermethrin

Cypermethrin was detected in four samples:

Topsoil (0 – 10 cm) in proximity to storage sites for timber: 0.15 and 0.39 mg/kg
Storm water from detached houses: 0.1 and 0.45 µg/l

The limit of quantification in water was 0.01 – 1 µg/l and 0.02 – 0.1 mg/kg in soils and sediments.

The concentrations found in the soils in this study are equal to or somewhat lower than the Dutch maximum permissible concentration (MPC) of 0.39 mg/kg (table 1.4) which indicates that they may cause negative effects on soil biota. The frequency of occurrence was quite low (two of 34 soils samples). On the other hand, cypermethrin was (as far as known) applied to these sites approximately 6- 8 months before the sampling. Since cypermethrin degrades rapidly in soil under aerobic conditions with measured half lives of 4 days to 12 weeks (HSDB) it may be that the concentrations were higher at more locations closer to the time of application.

A number of different biodegradation products of cypermethrin are known [for example: 3-(4-hydroxyphenoxy)benzyl ester; 3-(4-hydroxyphenoxy)benzoic acid; 3-phenoxybenzoic acid; and (+ or -)-cis- and (+ or -)-trans-3-(2-dichlorovinyl)-2,2-dimethyl-cyclopropanecarboxylic acid] (HSDB). The environmental fate and (eco)toxicity of the degradation products is not well known, but given the results they might merit further studies.

Deeper soil (10 – 20 cm below surface), below where cypermethrin was found did, not contain cypermethrin above the quantification limit. This indicates that leaching had not taken place since application of cypermethrin to the timber. In accordance, cypermethrin is expected to have no or very low mobility based upon a range of Koc values from 5,800 to 160,000 (table 1.4).

This may also explain why previous studies in Sweden of cypermethrin in streams in the vicinity of storage sites for timber only showed trace concentration in the sediments (Goedkoop and Kreuger 2006). It may be that cypermethrin that is not applied in very close vicinity to surface waters is mainly a soil problem because of a limited leaching to surface waters.

This may also explain why cypermethrin has not been found within the regional monitoring of pesticides that is done by the Swedish Agricultural University and financed by the Swedish Environmental protection Agency (table 3.5).

Table 3.5 Monitoring data for Cypermethrin from regional and local monitoring of pesticides in surface waters, ground waters and drinking waters. The database is maintained by the Swedish Agricultural University with financing from the Swedish Environmental protection Agency. All data is supplied from regional monitoring of pesticides. http://vv.mv.slu.se/.

	Years	Number of analyses	Number of occasions when detected	Median concentration	Maximum concentration
Ground water (µg/l)	Before 1990 - 1997	761	0	0	0
	1998 - 2007	350	0	0	0
Surface water (µg/l)	Before 1990 - 1997	1037	0	0	0
	1998 - 2007	255	0	0	0
Drinking water (µg/l)	Before 1990 - 1997	361	0	0	0
	1998 - 2007	125	0	0	0

Storm water was sampled from five separate areas with detached houses and villa gardens. Cypermethrin was found in storm water from two of these areas at concentrations 4500 higher than the guideline value for Swedish surface waters (0.0001 - 0.0002 µg/l, table 1.4). The storm water will be heavily diluted in surface waters or treated in sewage treatment plants and the levels found do not give rise to any immediate concern. Nevertheless, the results demonstrate that household usage of insecticide products may be a more important source of cypermethrin (and perhaps other pesticides) than previously known.

Conclusions and recommendations

The results may merit further screening of cypermethrin in soils surrounding storage sites for timber at times closer to when the insecticide is applied. This is only of interest if the use of cypermethrin for protection of felled timber continues. This practice has to be approved by local authorities and it is not certain that such approval will always be forthcoming.

Given that two out of five storm waters from areas with detached houses contained cypermethrin, future screening of cypermethrin (and other pesticides used in villa gardens) may be merited.

Since cypermethrin degrades easily giving rise to a number of degradation products it could also be of interest to focus on these metabolites rather than the parent compound.

3.5 Kathon

Kathon was not detected in any of the samples. The limit of quantification in water was 1 – 100 µg/l and 0.05 – 0.1 mg/kg in soils and sediments.

Kathon is a widely used biocide in a number of both household products (Fewings and Menné 1999,) and industrial applications, and it was somewhat unexpected that it was never found in incoming water to sewage treatment plants. It was neither found in incoming, water, outgoing water or sludge at paper mills where it is used to combat microbial growth on machine equipment.

Literature data indicate that the most likely reason for lack of detection is that the isothiazolinones MI and CMI (see table 1.5 for explanation of MI and CMI) are easily (bio)degraded (Madsen et al. 2001, Rafoth et al.2007)

90% of of MI and 70% of CMI was transformed in 24 hours in an aerobic experimental river sediment-water giving a calculated half life of only 9 hours and 17 hours for MI and CMI respectively (Madsen et al. 2001). Both compounds were transformed to several unidentified polar metabolites. At the end of the experiments metabolites that were bound in the sediment corresponded to 55% - 57% of the added mother compound which indicates that the metabolites are more stable than the original compound.

The biodegradability of CMI has also been examined under anoxic conditions in a river sediment-water system giving a half life of 4.6 h. It has been proposed that the anaerobic degradation of CMI leads to the same type of metabolites as proposed for aerobic degradation of MI and CMI.

The ultimate aerobic biodegradability (i.e. complete degradation to carbon dioxide) of MI and CMI has been examined in an OECD test (301B). The ultimate biodegradability of CMI and MI were close to the pass level for ready biodegradability (Madsen et al. 2001).

CMI and CI also degrades quickly in natural river waters. The compounds disappeared completely after 4 – 8 days in river Rhine water kept at 23°C and by approximately 60 – 90% after 21 days in river Rhine water stored at 4°C (Rafoth et al 2007).

The Kathon compound MI and CMI were measured together with three other isothiazolinone compounds in incoming and outgoing water from a very large municipal wastewater treatment plant in Germany. CMI and MI were detected in one of seven incoming water samples at a level of 0.5 µg/l. which is below the quantification limit in this study (Rafoth et al. 2007). In the same samples another isothiazolinone compound (1,2-benzo isothiazolinones; BIT) was frequently found at concentrations ranging from 1.5 – 3 µg/l. BIT is increasingly replacing CMI in cleaning agents, paints, adhesives etc (Rafoth et al. 2007) although the usage in shampoos and liquid soaps is still dominated by CMI (Rafoth et al. 2007).

Neither CMI, MI or any other isothiazolinone compounds were found in effluent waters from the municipal wastewater treatment plant or in major German rivers such as Rhine, Main, Neckar or Danube, or in small German rivers with relatively large contributions from wastewater treatment plants (Rafoth et al. 2007). These results were interpreted such that the isothiazolinones were completely eliminated before reaching wastewater treatment plants and in the plants themselves.

Conclusions and recommendations

Based on the results from this screening, the German screening study and experimental studies on biodegradation there is no need for further screening of the Kathon compounds CMI or MI or any other isothiazolinone compounds. However, the need for further screening of isothiazolinone biodegradation products can not be excluded since the stability and ecotoxicity of the degradation products in the environment is largely unknown.

Some Kathon compounds are also used as biocides in boat paints. Since these specific Kathon compounds were not investigated in this screening study, harbor sediment was not included in the sampling plan for Kathon CMI and CI. This may be something to consider for future screening studies that could also focus on other boat paint biocides.

3.6 Propiconazole

Propiconazole was the most commonly detected substance in this study since it was found in 21 of 71 samples from a paint industry, landfills, and storage sites for treated wood. The results are presented in table 3.6 below. The limit of quantification in water was 0.03 – 4 µg/l and 0.03 – 0.1 mg/kg in soils and sediments.

Table 3.6 Samples where propiconazole has been detected

Source	Matrix	Number of samples	Result
Paint industry	Storm water	3	0.67 - 85 µg/l
Paint industry	Groundwater	2	0.28 - 7.9 µg/l
Paint industry	Storm water manhole sediments	3	0.22 - 2.5 mg/kg DM
Paint industry, waste water treatment plant	Incoming water	1	150 µg/l
Paint industry, waste water treatment plant	Sludge	1	23 mg/kg DM
Storage for treated wood	Storm water manhole sediments	5	0.12 - 0.48 mg/kg DM
Storage for treated wood	Storm water	1	2.1 µg/l
Storage for treated	Soil	1	0.32 mg/kg DM

wood			
Landfill	Leachate	4	0.15 - 0.8 µg/l

Propiconazole has previously been found in Swedish surface waters (table 3.7) but not in sediments in agricultural areas (Adielson et al. 2005). In a previous screening study in Sweden, propiconazole was found in 2 out of 24 sludge samples from waste water treatment plants and in 2 out of 14 effluent water samples. Furthermore, propiconazole was also found in 1 out of 6 leachate samples from landfills and in a storm water sample and storm water sediments in the vicinity of a wood impregnation factory (Remberger et al. 2005).

In this study, focus was on storage sites where painted and/or impregnated wood is stored outdoors, landfills receiving painted and impregnated building material and paint industries were the substance is still used as a biocide in paint formulation. Propiconazole was detected in all samples that were taken at paint industries, including storm water and groundwater samples.

The concentrations can be compared to the guideline value for surface waters derived by the Swedish Chemicals Agency (Naturvårdsverket 1998). The guideline value of 7 µg/l represents the highest concentration where no negative ecological effects are expected. This value is exceeded in one storm water sample (85 µg/l) and one ground water sample (7.9 µg/l).

Propiconazole was also detected in all but one of the samples from storage sites for treated wood. Concentrations from these sites are generally lower than the samples from paint industries. The substance was also detected in four of nine landfill leachate samples. Concentrations are well under the surface water guideline value mentioned above and the most probable source of propikonazole in the landfill leachate is treated and painted wood products that are deposited at the landfill.

This study confirms that propikonazole may be a common contaminant in the vicinity of sites where paint is produced, painted products are stored and where painted products are deposited. This is despite a possibly a high degree of biodegradability. The estimated half-life of propiconazole in aerobic soils is about 40-70 days and in aerobic waters is about 25-85 days (HSDB).

Propiconazole is regularly sampled within the regional monitoring of pesticides (Table 3.7). It is found in surface waters in these studies, and the occurrence seem to increase from 1990 - 1997 (detected in 0.3% of sampled waters) to the period 1998 – 2007 (detected in 4% of sampled waters).

Table 3.7 Monitoring data for Propiconazole from regional and local monitoring of pesticides in surface waters, ground waters and drinking waters. The database is maintained by the Swedish Agricultural University with financing from the Swedish Environmental protection Agency. All data is supplied from regional monitoring of pesticides. http://vv.mv.slu.se/.

	Years	Number of analyses	Number of occasions when detected	Median concentration	Maximum concentration
Ground water (µg/l)	Before 1990 - 1997	765	0	0	0
	1998 - 2007	388	0	0	0
Surface water (µg/l)	Before 1990 - 1997	996	3	0.5	0.5
	1998 - 2007	410	16	0.03	1
Drinking water (µg/l)	Before 1990 - 1997	362	0	0	0
	1998 - 2007	135	0	0	0

Conclusions and recommendations

This and earlier screening studies show that propiconazole can be found in the vicinity of sites where water based paints are produced or where treated wood products are stored. However, the substance is not found at background lakes and only seldom within the regional monitoring program of pesticides (Table 3.7). Also, when detected in surface waters the levels are well below the national guideline value (Table 3.7). The substance is not classified as being bioaccumulative.

As long as no new information surfaces on the bioaccumulative potential or the (eco)toxicity of propikonazole no further screening is warranted.

However, the increasing levels seen in the regional monitoring (Table 3.7) together with the results from this study merits that the levels of propikonazole is continuously monitored and evaluated. As is the case for diuron, it may be pertinent to redesign the regional monitoring of pesticides to include non-agricultural sites, since propikonazole should be viewed as an industrial/product biocide as well as an agricultural biocide.

4 Conclusions and recommendations

In general, biocides do not seem to constitute a major problem in the Swedish environment. Even if some of them occur frequently close to important emission sources, the levels are usually well below risk levels. This is also supported by the results from an earlier screening study of biocides (Remberger et al. 2005). The reason for these results is probably a combination of low amounts used in relation to the size of the environmental compartments they are emitted to, and a generally high degree of (bio)degradability.

The recommendations for the specific substances are:

Tolylfluanide
There is no further need for screening or monitoring of tolylfluanide. It may be relevant to review German screening studies on the occurrence of degradation products of tolylfluanide before deciding if these should be investigated in the future.

Chlorothalonil
There is no further need for screening or monitoring of chlorothalonil based on the low amounts used and the lack of detection in this study.

Diuron
There is no need for further screening studies of diuron in abiotic matrices based on the fact that the substance is regularly measured within the regional monitoring program and by other authorities. A limited screening in biotic matrices may be warranted. There may also be a need for a limited screening of Diuron levels in air to evaluate the atmosphere as an important source of this substance.

Cypermethrin
If the use of cypermethrin for protection of felled timber continues it may be warranted with measurement in the soil close to the time of application to elucidate the possible effects on soil biota. Since two out of five storm waters from areas with detached houses contained cypermethrin future screening of cypermethrin (and other pesticides used in villa gardens) may be merited. Since cypermethrin degrades easily giving rise to a number of degradation products it could also be of interest to focus on these metabolites rather than the parent compound.

Kathon
Based on the low degree of occurrence in this study and a German screening study and the proven low persistence of these types of compounds there is no need for

further screening of the Kathon compounds CMI or MI or any other isothiazolinones. However, the need for further screening of isothiazolinone biodegradation products can not be excluded since the stability and ecotoxicity of these compounds in the environment is largely unknown. Some Kathon compounds (isothiazolinones) are also used as biocides in boat paints. These were not investigated in the present study, and this may be the focus of future screening studies since boat paints are in direct contact with the surface water environment. On the other hand, the high biodegradability of kathon compounds, may eliminate the need for such studies.

Propiconazole

The results from this screening and a previous screening of propiconazole shows that the compound mostly occurs in the vicinity of sites where paint is produced or where treated wood products are stored. Since the compound is regularly monitored there is no need for further focused screenings of this compound. However, the increasing levels seen in the regional monitoring (Table 3.7) together with the results from this study merits that the levels of propikonazole is continuously monitored and evaluated.

Regional monitoring of pesticides

The regional aquatic monitoring of pesticides includes a number of substances that should be viewed as industrial/product biocides as well as agricultural biocides. The results from this (diuron and propiconazole) and other screening studies of such biocides may motivate a redesign of the yearly monitoring of pesticides. This could mean a transition to include sites impacted by industrial and urban activities as well as waste water treatment plants and landfills.

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