Cyclohexane

Version 5.6 Revision Date 2023-05-18

According to Regulation (EC) No. 1907/2006, Regulation (EC) No. 2020/878

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier

Product information

Product Name : Cyclohexane
Material : 1015388, 1098296, 1080331, 1059057, 1026806, 1025303, 1026803, 1026805

EC-No.Registration number

Chemical name	CAS-No. EC-No. Index No.	Legal Entity Registration number
Cyclohexane	110-82-7 203-806-2 601-017-00-1	Chevron Phillips Chemical Company LP 01-2119463273-41-0001

1.2 Relevant identified uses of the substance or mixture and uses advised against

Relevant Identified Uses Supported : Manufacture
Use as an intermediate
Formulation
Use in coatings – industrial
Use in coatings – professional
Use as a cleaning agent – industrial

1.3 Details of the supplier of the safety data sheet

Company : Chevron Phillips Chemical Company LP
10001 Six Pines Drive
The Woodlands, TX 77380

Local : Chevron Phillips Chemicals International N.V.
Airport Plaza (Stockholm Building)
Leonardo Da Vincilaan 19
1831 Diegem
Belgium

SDS Requests: (800) 852-5530

Responsible Party: Product Safety Group
Email:sds@cpchem.com

1.4

Emergency telephone:

Health:
866.442.9628 (North America)
1.832.813.4984 (International)
Transport:
CHEMTREC 800.424.9300 or 703.527.3887(int'l)
Asia: CHEMWATCH (+612 9186 1132) China: 0532 8388 9090
Mexico CHEMTREC 01-800-681-9531 (24 hours)
South America SOS-Cotec Inside Brazil: 0800.111.767 Outside Brazil: +55.19.3467.1600
Argentina: +(54)-1159839431
EUROPE: BIG +32.14.584545 (phone) or +32.14583516 (telefax)
Austria: VIZ +43 1 406 43 43 (24 hours/day, 7 days/week)
Belgium: 070 245 245 (24 hours/day, 7 days/week)
Bulgaria: +359 2 9154 233
Croatia: +3851 2348 342 (24 hours/day, 7 days/week)
Cyprus: 1401
Czech Republic: Toxicological Information Center +420 224 919 293, +420 224 915 402
Denmark: Danish Poison Center (Giftlinjen): +45 8212 1212
Estonia: BIG +32.14.584545 (phone) or +32.14583516 (telefax)
Finland: 0800 147 111 09 471 977 (24 hours/day)
France: ORFILA number (INRS): + 33 (0) 1 45 42 59 59 (24 hours/day, 7 days/week)
Germany: BIG +32.14.584545 (phone) or +32.14583516 (telefax)
Greece: (0030) 2107793777 (24 hours/day, 7 days/week)
Hungary: +36-80-201-199 (24 hours/day, 7 days/week)
Iceland: 543 2222 (24 hours/day, 7 days/week)
Ireland: BIG +32.14.584545 (phone) or +32.14583516 (telefax)
Italy: BIG +32.14.584545 (phone) or +32.14583516 (telefax)
Latvia: State Fire and Rescue Service, phone number: 112; Toxicology and Sepsis Clinic Poisoning and Drug Information Center, Hipokrāta 2, Riga, Latvia, LV-1038, phone number +371 67042473. (24 hours.)
Liechtenstein: BIG +32.14.584545 (phone) or +32.14583516 (telefax)
Lithuania: +370 (85) 2362052
Luxembourg: (+352) 8002 5500 (24 hours/day, 7 days/week)
Malta: +356 2395 2000
The Netherlands: NVIC: +31 (0)88 755 8000
Norway: 22 59 13 00 (24 hours/day, 7 days/week)
Poland: BIG +32.14.584545 (phone) or +32.14583516 (telefax)
Portugal: CIAV phone number: +351 800 250 250
Romania: +40213183606
Slovakia: +421 2 5477 4166
Slovenia: Phone number: 112
Spain: National Emergency Telephone Number of Spanish Poison Centre: +34 91 562 04 20 (24 hours/day, 7 days/week)
Sweden: 112 – ask for Poisons Information

Responsible Department	:	Product Safety and Toxicology Group
E-mail address	:	SDS@CPChem.com
Website	:	www.CPChem.com

SECTION 2: Hazards identification

2.1

Classification of the substance or mixture

REGULATION (EC) No 1272/2008

Flammable liquids, Category 2	H225: Highly flammable liquid and vapor.
Skin irritation, Category 2	H315: Causes skin irritation.
Specific target organ toxicity - single exposure, Category 3, Central nervous system	H336: May cause drowsiness or dizziness.
Aspiration hazard, Category 1	H304: May be fatal if swallowed and enters airways.
Short-term (acute) aquatic hazard, Category 1	H400: Very toxic to aquatic life.
Long-term (chronic) aquatic hazard, Category 1	H410: Very toxic to aquatic life with long lasting effects.

2.2

Labeling (REGULATION (EC) No 1272/2008)

Hazard pictograms :

Signal Word : Danger

Hazard Statements :		
	H225	Highly flammable liquid and vapor.
	H304	May be fatal if swallowed and enters airways.
	H315	Causes skin irritation.
	H336	May cause drowsiness or dizziness.
	H410	Very toxic to aquatic life with long lasting effects.

Precautionary Statements :		
	Prevention:	
	P210	Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
	P273	Avoid release to the environment.
	Response:	
	P301 + P310	IF SWALLOWED: Immediately call a POISON CENTER/ doctor.
	P331	Do NOT induce vomiting.
	P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
	P391	Collect spillage.

Hazardous ingredients which must be listed on the label:

- 110-82-7 Cyclohexane

2.3

Other hazards

Results of PBT and vPvB assessment	:	This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.
Endocrine disrupting properties	:	The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

SECTION 3: Composition/information on ingredients

3.1 - 3.2
Substance or Mixture

Synonyms : Not Established

Molecular formula : C6H12

Hazardous ingredients

Chemical name	CAS-No. EC-No. Index No.	Classification (REGULATION (EC) No 1272/2008)	Concentration [wt%]	Specific Conc. Limits, M-factors and ATEs
Cyclohexane	110-82-7 203-806-2 601-017-00-1	Flam. Liq. 2; H225 Skin Irrit. 2; H315 STOT SE 3; H336 Asp. Tox. 1; H304 Aquatic Acute 1; H400 Aquatic Chronic 1; H410	99,9 - 100	M [Acute]=1

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1
Description of first-aid measures

General advice	:	Move out of dangerous area. Show this material safety data sheet to the doctor in attendance. Material may produce a serious, potentially fatal pneumonia if swallowed or vomited.
If inhaled	:	Consult a physician after significant exposure. If unconscious, place in recovery position and seek medical advice.
In case of skin contact	:	If skin irritation persists, call a physician. If on skin, rinse well with water. If on clothes, remove clothes.
In case of eye contact	:	Flush eyes with water as a precaution. Remove contact lenses. Protect unharmed eye. Keep eye wide open while rinsing. If eye irritation persists, consult a specialist.
If swallowed	:	Keep respiratory tract clear. Do NOT induce vomiting. Do not give milk or alcoholic beverages. Never give anything by mouth to an unconscious person. If symptoms persist, call a physician. Take victim immediately to hospital.

4.2 Most important symptoms and effects, both acute and delayed
Notes to physician

Symptoms : No data available.

Risks : No data available.

4.3 Indication of any immediate medical attention and special treatment needed

Treatment : No data available.

SECTION 5: Firefighting measures

Flash point : -18,3°C (-0,9°F)
Method: closed cup

Autoignition temperature : 260°C (500°F)

5.1
Extinguishing media

Suitable extinguishing media : Alcohol-resistant foam. Carbon dioxide (CO2). Dry chemical.

Unsuitable extinguishing media : High volume water jet.

5.2
Special hazards arising from the substance or mixture

Specific hazards during fire fighting : Do not allow run-off from fire fighting to enter drains or water courses.

5.3
Advice for firefighters

Special protective equipment for fire-fighters : Wear self-contained breathing apparatus for firefighting if necessary.

Further information : Collect contaminated fire extinguishing water separately. This must not be discharged into drains. Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations. For safety reasons in case of fire, cans should be stored separately in closed containments. Use a water spray to cool fully closed containers.

Fire and explosion protection : Do not spray on a naked flame or any incandescent material. Take necessary action to avoid static electricity discharge (which might cause ignition of organic vapors). Use only explosion-proof equipment. Keep away from open flames, hot surfaces and sources of ignition.

SECTION 6: Accidental release measures

6.1
Personal precautions, protective equipment and emergency procedures

Personal precautions : Use personal protective equipment. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapors accumulating to

form explosive concentrations. Vapors can accumulate in low areas.

6.2

Environmental precautions

Environmental precautions : Prevent product from entering drains. Prevent further leakage or spillage if safe to do so. If the product contaminates rivers and lakes or drains inform respective authorities.

6.3

Methods and materials for containment and cleaning up

Methods for cleaning up : Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13).

6.4

Reference to other sections

Reference to other sections : For personal protection see section 8. For disposal considerations see section 13.

For additional details, see the Exposure Scenario in the Annex portion

SECTION 7: Handling and storage

7.1

Precautions for safe handling

Handling

Advice on safe handling : Avoid formation of aerosol. Do not breathe vapors/dust. Avoid exposure - obtain special instructions before use. Avoid contact with skin and eyes. For personal protection see section 8. Smoking, eating and drinking should be prohibited in the application area. Take precautionary measures against static discharges. Provide sufficient air exchange and/or exhaust in work rooms. Open drum carefully as content may be under pressure. Dispose of rinse water in accordance with local and national regulations.

Advice on protection against fire and explosion : Do not spray on a naked flame or any incandescent material. Take necessary action to avoid static electricity discharge (which might cause ignition of organic vapors). Use only explosion-proof equipment. Keep away from open flames, hot surfaces and sources of ignition.

7.2

Conditions for safe storage, including any incompatibilities

Storage

Requirements for storage areas and containers : No smoking. Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Observe label precautions. Electrical installations / working materials must comply with the technological safety standards.

German storage class : Flammable liquids

7.3

Specific End Use

Use : For additional details, see the Exposure Scenario in the Annex portion

SECTION 8: Exposure controls/personal protection

8.1

Control parameters
Ingredients with workplace control parameters

SK

Zložky	Podstata	Hodnota	Kontrolné parametre	Poznámka
Cyclohexane	SK OEL	NPEL priemerný	200 ppm, 700 mg/m3	

SI

Sestavine	Osnova	Vrednost	Parametri nadzora	Pripomba
Cyclohexane	SI OEL	MV	200 ppm, 700 mg/m3	
	SI OEL	KTV	800 ppm, 2.800 mg/m3	

SE

Beståndsdelar	Grundval	Värde	Kontrollparametrar	Anmärkning
Cyclohexane	SE AFS	NGV	200 ppm, 700 mg/m3	

RS

Компоненты	Основа	Величина	Параметры контроля	Заметка
Циклогексан	RS OEL	GVI	200 ppm, 700 mg/m3	EU**,

EU** Substance mentioned in indicative exposure limit values in Directive 2006/15 / EC (second list)

RO

Componente	Sursă	Valoare	Parametri de control	Notă
Cyclohexane	RO OEL	TWA	200 ppm, 700 mg/m3	

PT

Componentes	Bases	Valor	Parâmetros de controlo	Nota
Cyclohexane	PT OEL	VLE-MP	100 ppm,	
	PT DL 305/2007	oito horas	200 ppm, 700 mg/m3	

PL

Składniki	Podstawa	Wartość	Parametry dotyczące kontroli	Uwaga
Cyclohexane	PL NDS	NDS	300 mg/m3	
	PL NDS	NDSch	1.000 mg/m3	

NO

Komponenter	Grunnlag	Verdi	Kontrollparametrer	Nota
Cyclohexane	FOR-2011-12-06-1358	GV	150 ppm, 525 mg/m3	

NL

Bestanddelen	Basis	Waarde	Controleparameters	Opmerking
Cyclohexane	NL WG	TGG-8 uur	700 mg/m3	
	NL WG	TGG-15 min	1.400 mg/m3	

MT

Components	Basis	Value	Control parameters	Note
Cyclohexane	MT OEL	TWA	200 ppm, 700 mg/m3	

MK

Съставки	Основа	Стойност	Параметри на контрол	Бележка
Cyclohexane	MK OEL	MV	200 ppm, 700 mg/m3	

LV

Sastāvdaļas	Bāze	Vērtība	Pārvaldības parametri	Piezīme
Cyclohexane	LV OEL	AER 8 st	23 ppm, 80 mg/m3	

LU

Composants	Base	Valeur	Paramètres de contrôle	Note
Cyclohexane	LU OEL	TWA	200 ppm, 700 mg/m3	

LT

Komponentai	Šaltinis	Vertė	Kontrolės parametrai	Pastaba
Cyclohexane	LT OEL	IPRD	200 ppm, 700 mg/m3	

IT

Componenti	Base	Valore	Parametri di controllo	Nota
Cyclohexane	IT VLEP	TWA	100 ppm, 350 mg/m3	

IS

Komponenter	Grunnlag	Verdi	Kontrollparametrer	Nota
Cyclohexane	IS OEL	TWA	50 ppm, 175 mg/m3	

IE

Components	Basis	Value	Control parameters	Note
Cyclohexane	IE OEL	OELV - 8 hrs (TWA)	200 ppm, 700 mg/m3	

HU

Komponensek	Bázis	Érték	Ellenőrzési paraméterek	Megjegyzés
Cyclohexane	HU OEL	AK-érték	700 mg/m3	N, EU2,

EU2 2006/15/EK irányelvben közölt érték
N Irritáló anyagok, egyszerű fojtógázok, csekély egészségkárosító hatással bíró anyagok. Korrekció NEM szükséges.

HR

Sastojci	Temelj	Vrijednost	Nadzorni parametri	Bilješka
Cyclohexane	HR OEL	GVI	200 ppm, 700 mg/m3	koža,

koža Razvrstana kao tvar koja nadražuje kožu (H315) ili je takva napomena navedena u direktivama

GR

Συστατικά	Βάση	Τιμή	Παράμετροι ελέγχου	Σημείωση
Cyclohexane	GR OEL	TWA	200 ppm, 700 mg/m3	

GB

Components	Basis	Value	Control parameters	Note
Cyclohexane	GB EH40	TWA	100 ppm, 350 mg/m3	
	GB EH40	STEL	300 ppm, 1.050 mg/m3	

FR

Composants	Base	Valeur	Paramètres de contrôle	Note
Cyclohexane	FR VLE	VME	200 ppm, 700 mg/m3	VLR contraignantes,
	FR VLE	VLCT (VLE)	375 ppm, 1.300 mg/m3	Valeurs limites indicatives,

Valeurs limites indicatives Valeurs limites indicatives
VLR contraignantes Valeurs limites réglementaires contraignantes

FI

Aineosat	Peruste	Arvo	Valvontaa koskevat muuttujat	Huomautus
Cyclohexane	FI OEL	HTP-arvot 8h	100 ppm, 350 mg/m3	
	FI OEL	HTP-arvot 15 min	250 ppm, 875 mg/m3	

ES

Componentes	Base	Valor	Parámetros de control	Nota
Cyclohexane	ES VLA	VLA-ED	200 ppm, 700 mg/m3	

EE

Komponendid, osad	Alused	Väärtus	Kontrolliparameetrid	Märkused
Cyclohexane	EE OEL	Piirnorm	200 ppm, 700 mg/m3	

DK

Komponenter	Basis	Værdi	Kontrolparametre	Note
Cyclohexane	DK OEL	GV	50 ppm, 172 mg/m3	

DE

Inhaltsstoffe	Grundlage	Wert	Zu überwachende Parameter	Bemerkung
Cyclohexane	DE TRGS 900	AGW	200 ppm, 700 mg/m3	

CZ

Složky	Základ	Hodnota	Kontrolní parametry	Poznámka
Cyclohexane	CZ OEL	PEL	700 mg/m3	I,
	CZ OEL	NPK-P	2.000 mg/m3	I,

I dráždí sliznice (oči, dýchací cesty), respektive kůži

CY

Συστατικά	Βάση	Τιμή	Παράμετροι ελέγχου	Σημείωση
Cyclohexane	CY OEL	TWA	200 ppm, 700 mg/m3	

CH

Inhaltsstoffe	Grundlage	Wert	Zu überwachende Parameter	Bemerkung
Cyclohexane	CH SUVA	MAK-Wert	200 ppm, 700 mg/m3	NIOSH,
	CH SUVA	KZGW	800 ppm, 2.800 mg/m3	NIOSH,

NIOSH National Institute for Occupational Safety and Health

BG

Съставки	Основа	Стойност	Параметри на контрол	Бележка
Cyclohexane	BG OEL	TWA	200 ppm, 700 mg/m3	

BE

Bestanddelen	Basis	Waarde	Controleparameters	Opmerking
Cyclohexane	BE OEL	TGG 8 hr	100 ppm, 350 mg/m3	

AT

Inhaltsstoffe	Grundlage	Wert	Zu überwachende Parameter	Bemerkung
Cyclohexane	AT OEL	MAK-TMW	200 ppm, 700 mg/m3	
	AT OEL	MAK-KZW	800 ppm, 2.800 mg/m3	

Biological exposure indices

SI

Ime snovi	Št. CAS	Parametri nadzora	Čas vzorčenja	Sprememba
Cyclohexane	110-82-7	1,2-cicloheksandiol: 150 mg/g kreatinina po hidrolizi (Urin)	pri dolgotrajni izpostavljenosti: ob koncu delovne izmene po več zaporednih delavnikihOb koncu delovne izmene	2018-12-04

HR

Naziv tvari	CAS-br.	Nadzorni parametri	Vrijeme uzorkovanja	Ažurirati
Cyclohexane	110-82-7	1,2-cikloheksandiol: 150 mg/g kreatinina Računato na prosječnu vrijednost kreatinina od 1,2 g/L urina. Za sve rezultate koji se izražavaju na kreatinin, koncentracije kreatinina < 0,5 g/L i > 3,0 g/L ne mogu se uzeti u obzir. (Urin)	kod kronične izloženosti nakon nekoliko uzastopnih smjenana kraju radne smjene	2018-10-12
		1,2-cikloheksandiol: 146 mmol/mol kreatinina Računato na prosječnu vrijednost kreatinina od 1,2 g/L urina. Za sve rezultate koji se izražavaju na kreatinin, koncentracije kreatinina < 0,5 g/L i > 3,0 g/L ne mogu se uzeti u obzir. (Urin)	kod kronične izloženosti nakon nekoliko uzastopnih smjenana kraju radne smjene	2018-10-12
		cikloheksanol: 4.49 µmol/l (Krv)	za vrijeme izloženosti	2018-10-12
		cikloheksanol: 450 µg/l (Krv)	za vrijeme izloženosti	2018-10-12
		cikloheksanol: 3.61 mmol/mol kreatinina Računato na prosječnu vrijednost kreatinina od 1,2 g/L urina. Za sve rezultate koji se izražavaju na kreatinin, koncentracije kreatinina < 0,5 g/L i > 3,0 g/L ne mogu se uzeti u obzir. (Urin)	za vrijeme druge polovice radne smjene	2018-10-12

		cikloheksanol: 3.2 mg/g kreatinina Računato na prosječnu vrijednost kreatinina od 1,2 g/L urina. Za sve rezultate koji se izražavaju na kreatinin, koncentracije kreatinina < 0,5 g/L i > 3,0 g/L ne mogu se uzeti u obzir. (Urin)	za vrijeme druge polovice radne smjene	2018-10-12

DE

Stoffname	CAS-Nr.	Zu überwachende Parameter	Probennahmezeitpunkt	Stand
Cyclohexane	110-82-7	1,2-Cyclohexandiol: 150 mg/g Kreatinin Nach Hydrolyse (Urin)	bei Langzeitexposition: nach mehreren vorangegangenen SchichtenExpositionsende, bzw. Schichtende	2018-06-07

CH

Stoffname	CAS-Nr.	Zu überwachende Parameter	Probennahmezeitpunkt	Stand
Cyclohexane	110-82-7	Gesamt-1,2-Cyclohexandiol: 150 mg/g Kreatinin (Urin)	Expositionsende, bzw. Schichtendebei Langzeitexposition: nach mehreren vorangegangenen Schichten	2011-01-01
		Gesamt-1,2-Cyclohexandiol: 146 µmol/mmol Kreatinin (Urin)	Expositionsende, bzw. Schichtendebei Langzeitexposition: nach mehreren vorangegangenen Schichten	2011-01-01

DNEL : End Use: Workers
Routes of exposure: Inhalation
Potential health effects: Acute effects, Systemic effects
Value: 700 mg/m3

DNEL : Routes of exposure: Inhalation
Potential health effects: Acute effects, Local effects
Value: 700 mg/m3

DNEL : Routes of exposure: Inhalation
Potential health effects: Chronic effects, Systemic effects
Value: 700 mg/m3

DNEL : Routes of exposure: Inhalation
Potential health effects: Chronic effects, Local effects
Value: 700 mg/m3

DNEL : Routes of exposure: Skin contact
Potential health effects: Chronic effects, Systemic effects
Value: 2016 mg/kg

PNEC : Fresh water
Value: 0,207 mg/l

PNEC : Sea water
Value: 0,207 mg/l

PNEC	:	Fresh water sediment Value: 3,267 mg/kg
PNEC	:	Sea sediment Value: 3,267 mg/kg
PNEC	:	Soil Value: 2,99 mg/kg

8.2

Exposure controls
Engineering measures

Adequate ventilation to control airborned concentrations below the exposure guidelines/limits. Consider the potential hazards of this material (see Section 2), applicable exposure limits, job activities, and other substances in the work place when designing engineering controls and selecting personal protective equipment. If engineering controls or work practices are not adequate to prevent exposure to harmful levels of this material, the personal protective equipment listed below is recommended. The user should read and understand all instructions and limitations supplied with the equipment since protection is usually provided for a limited time or under certain circumstances.

Personal protective equipment

Respiratory protection	:	If ventilation or other engineering controls are not adequate to maintain minimal oxygen content of 19.5% by volume under normal atmospheric pressure, a supplied-air NIOSH approved respirator may be appropriate. If exposure to harmful levels of airborne material may occur, a NIOSH approved respirator that provides protection may be appropriate, such as:. Air-Purifying Respirator for Organic Vapors. A positive pressure, air-supplying respirator may be appropriate if there is potential for uncontrolled release, aerosolization, exposure levels are not known, or other circumstances where air-purifying respirators may not provide adequate protection.
Hand protection	:	The suitability for a specific workplace should be discussed with the producers of the protective gloves. Please observe the instructions regarding permeability and breakthrough time which are provided by the supplier of the gloves. Also take into consideration the specific local conditions under which the product is used, such as the danger of cuts, abrasion, and the contact time. Gloves should be discarded and replaced if there is any indication of degradation or chemical breakthrough.
Eye protection	:	Eye wash bottle with pure water. Tightly fitting safety goggles.
Skin and body protection	:	Choose body protection in relation to its type, to the concentration and amount of dangerous substances, and to the specific work-place. Wear as appropriate:. Flame retardant antistatic protective clothing. Workers should wear antistatic footwear.
Hygiene measures	:	When using do not eat or drink. When using do not smoke. Wash hands before breaks and at the end of workday.

For additional details, see the Exposure Scenario in the Annex portion

SECTION 9: Physical and chemical properties

9.1

Information on basic physical and chemical properties

Appearance

Physical state	:	liquid
Color	:	Colorless
Odor	:	chlorform-like,irritating

Safety data

Flash point	:	-18,3°C (-0,9°F) Method: closed cup
Lower explosion limit	:	1,3 %(V)
Upper explosion limit	:	8 %(V)
Oxidizing properties	:	no
Autoignition temperature	:	260°C (500°F)
Molecular formula	:	C6H12
Molecular weight	:	84,18 g/mol
pH	:	Not applicable
Pour point	:	No data available
Melting point/range		6,59°C (43,86°F)
Boiling point/boiling range	:	80,7°C (177,3°F)
Vapor pressure	:	3,26 PSI at 37,8°C (100,0°F)
Relative density	:	0,78 at 15,6 °C (60,1 °F)
Density	:	0,8 g/cm3
Water solubility	:	Soluble in hydrocarbon solvents, natural oils, fats, and waxes; insoluble in water.
Partition coefficient: n-octanol/water	:	No data available
Viscosity, kinematic	:	0,953 cSt at 37,8°C (100,0°F)
Relative vapor density	:	2,9 (Air = 1.0)
Evaporation rate	:	1,95
Percent volatile	:	0,01 %

9.2

Other information

Conductivity : < 5 pSm

SECTION 10: Stability and reactivity

10.1

Reactivity : Stable at normal ambient temperature and pressure.

10.2

Chemical stability : This material is considered stable under normal ambient and anticipated storage and handling conditions of temperature and pressure.

10.3

Possibility of hazardous reactions

Hazardous reactions : Further information: No decomposition if stored and applied as directed.

Hazardous reactions: Vapors may form explosive mixture with air.

10.4

Conditions to avoid : Heat, flames and sparks.

10.5

Materials to avoid : May react with oxygen and strong oxidizing agents, such as chlorates, nitrates, peroxides, etc.

10.6

Other data : No decomposition if stored and applied as directed.

SECTION 11: Toxicological information

11.1

Information on toxicological effects

Acute oral toxicity

Cyclohexane : LD50: > 5.000 mg/kg
Species: Rat
Sex: male and female
Method: OECD Test Guideline 401

Acute inhalation toxicity

Cyclohexane : LC50: >32,880 mg/m3Exposure time: 4 h
Species: Rat
Sex: male and female
Test atmosphere: vapor

Method: OECD Test Guideline 403

Skin irritation

Cyclohexane : May cause skin irritation in susceptible persons.

Eye irritation

Cyclohexane : No eye irritation

Sensitization

Cyclohexane : Did not cause sensitization on laboratory animals.

Repeated dose toxicity

Cyclohexane : Species: Rat
Application Route: Inhalation
Dose: 0, 500, 2000, 7000 ppm
Exposure time: 90 day
Number of exposures: 6 h/d, 5 d/wk
NOEL: 2000 ppm

Species: Rat, Male and female
Sex: Male and female
Application Route: Inhalation
Dose: 0, 500, 2,000, 7000 ppm
Exposure time: 13-14 wk
Number of exposures: 6 hr/d, 5 d/wk
NOEL: 7000 ppm

Species: Mouse, Male and female
Sex: Male and female
Application Route: Inhalation
Dose: 0, 500, 2000, 7000 ppm
Exposure time: 13-14 wk
Number of exposures: 6 hr/d, 5 d/wk
NOEL: 2000 ppm
Target Organs: Blood

Genotoxicity in vitro

Cyclohexane : Test Type: Ames test
Metabolic activation: with and without metabolic activation
Method: Mutagenicity (Escherichia coli - reverse mutation assay)
Result: negative

Test Type: Mouse lymphoma assay
Metabolic activation: with and without metabolic activation
Result: negative

Test Type: Mouse lymphoma assay
Metabolic activation: with and without metabolic activation
Method: OECD Guideline 476
Result: negative

Genotoxicity in vivo

Cyclohexane : Test Type: Cytogenetic assay
Species: Rat
Cell type: Bone marrow
Dose: 96.6, 307.2, 10141.6 ppm
Result: negative

Reproductive toxicity

Cyclohexane : Species: Rat
Application Route: Inhalation
Dose: 0, 500, 2000, 7000 ppm
Number of exposures: 6 hr/d, 5 d/wk
Method: OECD Test Guideline 416
NOAEL Parent: 500 ppm
NOAEL F1: 7000 ppm
NOAEL F2: 7000 ppm

Developmental Toxicity

Cyclohexane : Species: Rat
Application Route: Inhalation
Dose: 0, 500, 2,000, 7,000 PPM
Number of exposures: 6 hr/d
Test period: GD 6-15
Method: OECD Guideline 414
NOAEL Teratogenicity: 7,000 ppm
NOAEL Maternal: 500 ppm

Species: Rabbit
Application Route: Inhalation
Dose: 0, 500, 2,000, 7,000 PPM
Number of exposures: 6 hr/d
Test period: GD 6-18
Method: OECD Guideline 414
NOAEL Teratogenicity: 7,000 ppm
NOAEL Maternal: 500 ppm

Cyclohexane
Aspiration toxicity : May be fatal if swallowed and enters airways.
Substances known to cause human aspiration toxicity hazards or to be regarded as if they cause human aspiration toxicity hazard.

Specific Target Organ Toxicity (Single Exposure)
Cyclohexane : Route of Exposure:Inhalation
Target Organs: Central nervous system
Assessment: May cause drowsiness or dizziness.

Specific Target Organ Toxicity (Repeated Exposure)
Cyclohexane : Assessment: The substance or mixture is not classified as specific target organ toxicant, repeated exposure.
Remarks: Not classified

CMR effects

Cyclohexane : Carcinogenicity: Weight of evidence does not support

classification as a carcinogen
Mutagenicity: Did not show mutagenic effects in animal experiments.
Teratogenicity: Did not show teratogenic effects in animal experiments.
Reproductive toxicity: No toxicity to reproduction

11.2
Information on other hazards

Cyclohexane
Further information : Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting. Concentrations substantially above the TLV value may cause narcotic effects. Solvents may degrease the skin.

Endocrine disrupting properties : The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

SECTION 12: Ecological information

12.1
Toxicity

Ecotoxicity effects
Toxicity to fish

Cyclohexane : LC50: 4,53 mg/l
Exposure time: 96 h
Species: Pimephales promelas (fathead minnow)
Method: OECD Test Guideline 203

Toxicity to daphnia and other aquatic invertebrates

Cyclohexane : EC50: 0,9 mg/l
Exposure time: 48 h
Species: Daphnia magna (Water flea)
Method: OECD Test Guideline 202

Toxicity to algae

Cyclohexane : EbC50: 3,4 mg/l
Exposure time: 72 h
Species: Selenastrum capricornutum (algae)

NOEC: 0,925 mg/l
Exposure time: 72 h
Species: Pseudokirchneriella subcapitata (microalgae)
Method: OECD Test Guideline 201

M-Factor
cyclohexane : M-Factor (Acute Aquat. Tox.) 1

12.2
Persistence and degradability

Biodegradability

Cyclohexane : 77 %
Testing period: 28 d
Method: OECD Test Guideline 301
This material is expected to be readily biodegradable.

12.3
Bioaccumulative potential
Elimination information (persistence and degradability)

Bioaccumulation

Cyclohexane : Bioconcentration factor (BCF): 167
This material is not expected to bioaccumulate.

12.4
Mobility in soil

Mobility : No data available

12.5
Results of PBT and vPvB assessment
Results of PBT assessment : This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6
Endocrine disrupting properties

Endocrine disrupting properties : The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

12.7
Other adverse effects

Additional ecological information : Very toxic to aquatic life with long lasting effects.

12.8
Additional Information

Ecotoxicology Assessment

Short-term (acute) aquatic hazard
Cyclohexane : Very toxic to aquatic life.

Long-term (chronic) aquatic hazard
Cyclohexane : Very toxic to aquatic life with long lasting effects.

SECTION 13: Disposal considerations

13.1

Waste treatment methods

The information in this SDS pertains only to the product as shipped.

Use material for its intended purpose or recycle if possible. This material, if it must be discarded, may meet the criteria of a hazardous waste as defined by US EPA under RCRA (40 CFR 261) or other State and local regulations. Measurement of certain physical properties and analysis for regulated components may be necessary to make a correct determination. If this material is classified as a hazardous waste, federal law requires disposal at a licensed hazardous waste disposal facility.

Product	:	The product should not be allowed to enter drains, water courses or the soil. Do not contaminate ponds, waterways or ditches with chemical or used container. Send to a licensed waste management company.
Contaminated packaging	:	Empty remaining contents. Dispose of as unused product. Do not re-use empty containers. Do not burn, or use a cutting torch on, the empty drum.

For additional details, see the Exposure Scenario in the Annex portion

SECTION 14: Transport information

14.1 - 14.7

Transport information

The shipping descriptions shown here are for bulk shipments only, and may not apply to shipments in non-bulk packages (see regulatory definition).

Consult the appropriate domestic or international mode-specific and quantity-specific Dangerous Goods Regulations for additional shipping description requirements (e.g., technical name or names, etc.) Therefore, the information shown here, may not always agree with the bill of lading shipping description for the material. Flashpoints for the material may vary slightly between the SDS and the bill of lading.

US DOT (UNITED STATES DEPARTMENT OF TRANSPORTATION)

UN1145, CYCLOHEXANE, 3, II, RQ (CYCLOHEXANE)

IMO / IMDG (INTERNATIONAL MARITIME DANGEROUS GOODS)

UN1145, CYCLOHEXANE, 3, II, (-18,3 °C c.c.), MARINE POLLUTANT, (CYCLOHEXANE)

IATA (INTERNATIONAL AIR TRANSPORT ASSOCIATION)

UN1145, CYCLOHEXANE, 3, II

ADR (AGREEMENT ON DANGEROUS GOODS BY ROAD (EUROPE))

UN1145, CYCLOHEXANE, 3, II, (D/E), ENVIRONMENTALLY HAZARDOUS, (CYCLOHEXANE)

RID (REGULATIONS CONCERNING THE INTERNATIONAL TRANSPORT OF DANGEROUS GOODS (EUROPE))

33,UN1145,CYCLOHEXANE, 3, II, ENVIRONMENTALLY HAZARDOUS, (CYCLOHEXANE)

ADN (EUROPEAN AGREEMENT CONCERNING THE INTERNATIONAL CARRIAGE OF DANGEROUS GOODS BY INLAND WATERWAYS)
UN1145, CYCLOHEXANE, 3, II, ENVIRONMENTALLY HAZARDOUS, (CYCLOHEXANE)
For Tank Vessels and/or Barges:
UN1145, CYCLOHEXANE, 3, (N1), II, ENVIRONMENTALLY HAZARDOUS, (CYCLOHEXANE)

Other information	**:**	**Cyclohexane, S.T. 2, Cat. Y**

Maritime transport in bulk according to IMO instruments

SECTION 15: Regulatory information

15.1

Safety, health and environmental regulations/legislation specific for the substance or mixture
National legislation

Commission Regulation (EU) 2020/878 of 18 June 2020 amending Regulation (EC) No 1907/2006 of the European Parliament and of the Council on the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)

Water hazard class (Germany) : WGK 2 obviously hazardous to water

15.2

Chemical Safety Assessment

Components	:	cyclohexane	A Chemical Safety Assessment has been carried out for this substance.	203-806-2

Major Accident Hazard Legislation : ZEU_SEVES3 Update:
FLAMMABLE LIQUIDS
P5c
Quantity 1: 5.000 t
Quantity 2: 50.000 t

: ZEU_SEVES3 Update:
ENVIRONMENTAL HAZARDS
E1
Quantity 1: 100 t
Quantity 2: 200 t

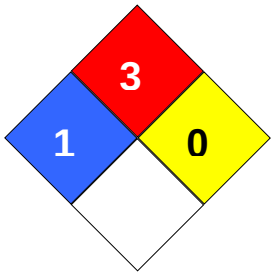
Notification status

Europe REACH	:	This product is in full compliance according to REACH regulation 1907/2006/EC.
Switzerland CH INV	:	On the inventory, or in compliance with the inventory
United States of America (USA) TSCA	:	On or in compliance with the active portion of the TSCA inventory
Canada DSL	:	All components of this product are on the Canadian DSL
Other AICS	:	On the inventory, or in compliance with the inventory

New Zealand NZIoC	:	On the inventory, or in compliance with the inventory
Japan ENCS	:	On the inventory, or in compliance with the inventory
Korea KECI	:	A substance(s) in this product was not registered, notified to be registered, or exempted from registration by CPChem according to K-REACH regulations. Importation or manufacture of this product is still permitted provided the Korean Importer of Record has themselves notified the substance or the exported amount does not exceed the minimum threshold quantity of the non-registered substance(s).
Philippines PICCS	:	On the inventory, or in compliance with the inventory
China IECSC	:	On the inventory, or in compliance with the inventory
Taiwan TCSI	:	On the inventory, or in compliance with the inventory

SECTION 16: Other information

NFPA Classification : Health Hazard: 1
Fire Hazard: 3
Reactivity Hazard: 0



Further information

Legacy SDS Number : 895

Significant changes since the last version are highlighted in the margin. This version replaces all previous versions.

The information in this SDS pertains only to the product as shipped.

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

Key or legend to abbreviations and acronyms used in the safety data sheet			
ACGIH	American Conference of Government Industrial Hygienists	LD50	Lethal Dose 50%
AIIC	Australian Inventory of Industrial Chemicals	LOAEL	Lowest Observed Adverse Effect Level
DSL	Canada, Domestic Substances List	NFPA	National Fire Protection Agency
NDSL	Canada, Non-Domestic Substances List	NIOSH	National Institute for Occupational Safety & Health
CNS	Central Nervous System	NTP	National Toxicology Program
CAS	Chemical Abstract Service	NZIoC	New Zealand Inventory of Chemicals
EC50	Effective Concentration	NOAEL	No Observable Adverse Effect Level
EC50	Effective Concentration 50%	NOEC	No Observed Effect Concentration
EGEST	EOSCA Generic Exposure Scenario Tool	OSHA	Occupational Safety & Health Administration

EOSCA	European Oilfield Specialty Chemicals Association	PEL	Permissible Exposure Limit
EINECS	European Inventory of Existing Chemical Substances	PICCS	Philippines Inventory of Commercial Chemical Substances
MAK	Germany Maximum Concentration Values	PRNT	Presumed Not Toxic
GHS	Globally Harmonized System	RCRA	Resource Conservation Recovery Act
>=	Greater Than or Equal To	STEL	Short-term Exposure Limit
IC50	Inhibition Concentration 50%	SARA	Superfund Amendments and Reauthorization Act.
IARC	International Agency for Research on Cancer	TLV	Threshold Limit Value
IECSC	Inventory of Existing Chemical Substances in China	TWA	Time Weighted Average
ENCS	Japan, Inventory of Existing and New Chemical Substances	TSCA	Toxic Substance Control Act
KECI	Korea, Existing Chemical Inventory	UVCB	Unknown or Variable Composition, Complex Reaction Products, and Biological Materials
<=	Less Than or Equal To	WHMIS	Workplace Hazardous Materials Information System
LC50	Lethal Concentration 50%	ATE	Acute toxicity estimate

Full text of H-Statements referred to under sections 2 and 3.

H225	Highly flammable liquid and vapor.
H304	May be fatal if swallowed and enters airways.
H315	Causes skin irritation.
H336	May cause drowsiness or dizziness.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.

Annex: Exposure Scenarios

Table of Contents

ES 1: Manufacture (M); Industrial uses (SU3).

1.1. Title section

Exposure Scenario name	:	Manufacture
Structured Short Title	:	Manufacture (M); Industrial uses (SU3).
Substance	:	cyclohexane EC-No.: 203-806-2

Environment		
CS 1	**Manufacture**	ERC1, ERC4
Worker		
CS 2	**General exposures (closed systems)**	PROC1
CS 3	**General exposures (closed systems), with sample collection, Storage, Product sampling**	PROC2
CS 4	**General exposures (closed systems), Product sampling**	PROC3
CS 5	**General exposures (open systems), Batch process, with sample collection**	PROC4
CS 6	**Equipment cleaning and maintenance**	PROC8a
CS 7	**Process sampling, Bulk transfers, Open systems, With potential for aerosol generation, Bulk transfers, Closed systems**	PROC8b
CS 8	**Laboratory activities**	PROC15

1.2. Conditions of use affecting exposure

1.2.1. Control of environmental exposure: Manufacture of substances (ERC1) / Industrial use of processing aids in processes and products, not becoming part of articles (ERC4)

Amount used (or contained in articles), frequency and duration of use/exposure		
Emission days	:	300
Conditions and measures related to sewage treatment plant		
STP type	:	Municipal sewage treatment plant
STP sludge treatment	:	Do not apply industrial sludge to natural soils.
Conditions and measures related to treatment of waste (including article waste)		
Waste treatment	:	During manufacturing no waste of the substance is generated.
Other conditions affecting environmental exposure		
Receiving surface water flow	:	18.000 m3/d
Local freshwater dilution factor	:	40

Local marine water dilution factor	:	100

1.2.2. Control of worker exposure: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions (PROC1)

Product (article) characteristics		
Physical form of product	:	Liquid, vapour pressure > 10 kPa at Standard Temperature and Pressure
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
No specific measures identified.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.

1.2.3. Control of worker exposure: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)

Product (article) characteristics		
Physical form of product	:	Liquid, vapour pressure > 10 kPa at Standard Temperature and Pressure
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
No specific measures identified.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.

1.2.4. Control of worker exposure: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)

Product (article) characteristics		
Physical form of product	:	Liquid, vapour pressure > 10 kPa at Standard Temperature

		and Pressure
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
No specific measures identified.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.

1.2.5. Control of worker exposure: Chemical production where opportunity for exposure arises (PROC4)

Product (article) characteristics		
Physical form of product	:	Liquid, vapour pressure > 10 kPa at Standard Temperature and Pressure
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
No specific measures identified.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.

1.2.6. Control of worker exposure: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities (PROC8a)

Product (article) characteristics		
Physical form of product	:	Liquid, vapour pressure > 10 kPa at Standard Temperature and Pressure
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
Drain down system prior to equipment break-in or maintenance.		
Other conditions affecting workers exposure		

Temperature	:	Assumes use at not more than 20°C above ambient temperature.

1.2.7. Control of worker exposure: Transfer of substance or mixture (charging/discharging) at dedicated facilities (PROC8b)

Product (article) characteristics		
Physical form of product	:	Liquid, vapour pressure > 10 kPa at Standard Temperature and Pressure
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
No specific measures identified.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.

1.2.8. Control of worker exposure: Use as laboratory reagent (PROC15)

Product (article) characteristics		
Physical form of product	:	Liquid, vapour pressure > 10 kPa at Standard Temperature and Pressure
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
No specific measures identified.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.

1.3. Exposure estimation and reference to its source

1.3.1. Environmental release and exposure: Manufacture of substances (ERC1) / Industrial use of processing aids in processes and products, not becoming part of articles (ERC4)

Protection Target	Exposure estimate	RCR

Freshwater	0,0652 mg/l (EUSES)	0,315
Sea water	0,0260 mg/l (EUSES)	0,126
Freshwater sediment	1,14 mg/kg wet weight (EUSES)	0,315
Sea sediment	0,456 mg/kg wet weight (EUSES)	0,578
Soil	0,0308 mg/kg wet weight (EUSES)	0,011
Air	1,39 mg/m³	

1.3.2. Worker exposure: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions (PROC1)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	Long-term	0,01 ppm (ECETOC TRA worker v3)	0,00
dermal	systemic	Long-term	0,34 mg/kg/d (ECETOC TRA worker v3)	0,00
combined routes			(ECETOC TRA worker v3)	0,00

1.3.3. Worker exposure: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	Long-term	50 ppm (ECETOC TRA worker v3)	0,25
dermal	systemic	Long-term	1,37 mg/kg/d (ECETOC TRA worker v3)	0,00
combined routes			(ECETOC TRA worker v3)	0,25

1.3.4. Worker exposure: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	Long-term	100 ppm (ECETOC TRA worker v3)	0,50
dermal	systemic	Long-term	0,34 mg/kg/d (ECETOC TRA worker v3)	0,00
combined routes			(ECETOC TRA worker v3)	0,50

1.3.5. Worker exposure: Chemical production where opportunity for exposure arises (PROC4)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	Long-term	100 ppm (ECETOC TRA worker v3)	0,50
dermal	systemic	Long-term	6,86 mg/kg/d (ECETOC TRA worker v3)	0,00
combined routes			(ECETOC TRA worker v3)	0,50

1.3.6. Worker exposure: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities (PROC8a)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	Long-term	50 ppm (ECETOC TRA worker v3)	0,25
dermal	systemic	Long-term	13,71 mg/kg/d (ECETOC TRA worker v3)	0,00
combined routes			(ECETOC TRA worker v3)	0,25

1.3.7. Worker exposure: Transfer of substance or mixture (charging/discharging) at dedicated facilities (PROC8b)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	Long-term	100 ppm (ECETOC TRA worker v3)	0,75
dermal	systemic	Long-term	6,86 mg/kg/d (ECETOC TRA worker v3)	0,00
combined routes			(ECETOC TRA worker v3)	0,75

1.3.8. Worker exposure: Use as laboratory reagent (PROC15)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	Long-term	50 ppm (ECETOC TRA worker v3)	0,25
dermal	systemic	Long-term	0,34 mg/kg/d (ECETOC TRA worker v3)	0,00

combined routes			(ECETOC TRA worker v3)	0,25

1.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposures are not expected to exceed the predicted DNELs and the resulting risk characterisation ratios are expected to be less than 1
Confirm that RMMs and OCs are as described or of equivalent efficiency.
When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposures are not expected to exceed the predicted PNECs and the resulting risk characterization ratios are expected to be less than 1.

ES 2: Use as an intermediate; Industrial uses (SU3).

2.1. Title section

Exposure Scenario name	:	Use as an intermediate
Structured Short Title	:	Use as an intermediate; Industrial uses (SU3).
Substance	:	cyclohexane EC-No.: 203-806-2

Environment		
CS 1	**Use as an intermediate**	ERC6a
Worker		
CS 2	**General exposures (closed systems)**	PROC1
CS 3	**General exposures (closed systems), with sample collection, Storage, Product sampling**	PROC2
CS 4	**General exposures (closed systems), Use in contained batch processes**	PROC3
CS 5	**General exposures (open systems), Batch process, with sample collection**	PROC4
CS 6	**Equipment cleaning and maintenance**	PROC8a
CS 7	**Process sampling, Bulk transfers, Open systems, With potential for aerosol generation**	PROC8b
CS 8	**Laboratory activities**	PROC15

2.2. Conditions of use affecting exposure

2.2.1. Control of environmental exposure: Use of intermediate (ERC6a)

Amount used (or contained in articles), frequency and duration of use/exposure		
Emission days	:	300
Technical and organisational conditions and measures		
Do not apply industrial sludge to natural soils. Air - minimum efficiency of > 80 % Water - minimum efficiency of 96,53 %		
Conditions and measures related to sewage treatment plant		
STP type	:	Municipal sewage treatment plant
STP sludge treatment	:	Do not apply industrial sludge to natural soils.
Conditions and measures related to treatment of waste (including article waste)		
Waste treatment	:	During manufacturing no waste of the substance is generated.

Other conditions affecting environmental exposure		
Receiving surface water flow	:	18.000 m3/d
Local freshwater dilution factor	:	10
Local marine water dilution factor	:	100

2.2.2. Control of worker exposure: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions (PROC1)

Product (article) characteristics		
Physical form of product	:	Liquid, vapour pressure > 10 kPa at Standard Temperature and Pressure
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
No specific measures identified.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.

2.2.3. Control of worker exposure: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)

Product (article) characteristics		
Physical form of product	:	Liquid, vapour pressure > 10 kPa at Standard Temperature and Pressure
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
No specific measures identified.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.

2.2.4. Control of worker exposure: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)

Product (article) characteristics		
Physical form of product	:	Liquid, vapour pressure > 10 kPa at Standard Temperature and Pressure
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
No specific measures identified.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.

2.2.5. Control of worker exposure: Chemical production where opportunity for exposure arises (PROC4)

Product (article) characteristics		
Physical form of product	:	Liquid, vapour pressure > 10 kPa at Standard Temperature and Pressure
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
No specific measures identified.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.

2.2.6. Control of worker exposure: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities (PROC8a)

Product (article) characteristics		
Physical form of product	:	Liquid, vapour pressure > 10 kPa at Standard Temperature and Pressure
Amount used (or contained in articles), frequency and duration of use/exposure		

Duration	:	Covers daily exposures up to 8 hours

Technical and organisational conditions and measures

Drain down system prior to equipment break-in or maintenance.

Other conditions affecting workers exposure

Temperature	:	Assumes use at not more than 20°C above ambient temperature.

2.2.7. Control of worker exposure: Transfer of substance or mixture (charging/discharging) at dedicated facilities (PROC8b)

Product (article) characteristics

Physical form of product	:	Liquid, vapour pressure > 10 kPa at Standard Temperature and Pressure

Amount used (or contained in articles), frequency and duration of use/exposure

Duration	:	Covers daily exposures up to 8 hours

Technical and organisational conditions and measures

No specific measures identified.

Other conditions affecting workers exposure

Temperature	:	Assumes use at not more than 20°C above ambient temperature.

2.2.8. Control of worker exposure: Use as laboratory reagent (PROC15)

Product (article) characteristics

Physical form of product	:	Liquid, vapour pressure > 10 kPa at Standard Temperature and Pressure

Amount used (or contained in articles), frequency and duration of use/exposure

Duration	:	Covers daily exposures up to 8 hours

Technical and organisational conditions and measures

No specific measures identified.

Other conditions affecting workers exposure

Temperature	:	Assumes use at not more than 20°C above ambient temperature.

2.3. Exposure estimation and reference to its source

2.3.1. Environmental release and exposure: Use of intermediate (ERC6a)

Protection Target	Exposure estimate	RCR
Freshwater	0,166 mg/l (EUSES)	0,804
Sea water	0,0166 mg/l (EUSES)	0,080
Freshwater sediment	2,92 mg/kg wet weight (EUSES)	0,805
Sea sediment	0,292 mg/kg wet weight (EUSES)	0,370
Soil	0,0043 mg/kg wet weight (EUSES)	0,001

2.3.2. Worker exposure: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions (PROC1)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	Long-term	0,01 ppm (ECETOC TRA worker v3)	0,00
dermal	systemic	Long-term	0,34 mg/kg/d (ECETOC TRA worker v3)	0,00
combined routes			(ECETOC TRA worker v3)	0,00

2.3.3. Worker exposure: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	Long-term	50 ppm (ECETOC TRA worker v3)	0,25
dermal	systemic	Long-term	1,37 mg/kg/d (ECETOC TRA worker v3)	0,00
combined routes			(ECETOC TRA worker v3)	0,25

2.3.4. Worker exposure: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	Long-term	100 ppm (ECETOC TRA worker v3)	0,50

dermal	systemic	Long-term	0,34 mg/kg/d (ECETOC TRA worker v3)	0,00
combined routes			(ECETOC TRA worker v3)	0,50

2.3.5. Worker exposure: Chemical production where opportunity for exposure arises (PROC4)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	Long-term	100 ppm (ECETOC TRA worker v3)	0,50
dermal	systemic	Long-term	6,86 mg/kg/d (ECETOC TRA worker v3)	0,00
combined routes			(ECETOC TRA worker v3)	0,50

2.3.6. Worker exposure: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities (PROC8a)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	Long-term	50 ppm (ECETOC TRA worker v3)	0,25
dermal	systemic	Long-term	13,71 mg/kg/d (ECETOC TRA worker v3)	0,01
combined routes			(ECETOC TRA worker v3)	0,26

2.3.7. Worker exposure: Transfer of substance or mixture (charging/discharging) at dedicated facilities (PROC8b)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	Long-term	150 ppm (ECETOC TRA worker v3)	0,75
dermal	systemic	Long-term	6,86 mg/kg/d (ECETOC TRA worker v3)	0,00
combined routes			(ECETOC TRA worker v3)	0,75

2.3.8. Worker exposure: Use as laboratory reagent (PROC15)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR

inhalative	systemic	Long-term	50 ppm (ECETOC TRA worker v3)	0,25
dermal	systemic	Long-term	0,34 mg/kg/d (ECETOC TRA worker v3)	0,00
combined routes			(ECETOC TRA worker v3)	0,25

2.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposures are not expected to exceed the predicted PNECs and the resulting risk characterization ratios are expected to be less than 1.
Confirm that RMMs and OCs are as described or of equivalent efficiency.

ES 3: Formulation; Industrial uses (SU3).

3.1. Title section

Exposure Scenario name	:	Formulation
Structured Short Title	:	Formulation; Industrial uses (SU3).
Substance	:	cyclohexane EC-No.: 203-806-2

Environment		
CS 1	**Formulation**	ERC2
Worker		
CS 2	**General exposures (closed systems)**	PROC1
CS 3	**General exposures (closed systems), with sample collection, Storage, Product sampling**	PROC2
CS 4	**Process sampling, General exposures (closed systems), Use in contained batch processes, Batch processes at elevated temperatures**	PROC3
CS 5	**General exposures (open systems), Batch process, with sample collection, With potential for aerosol generation**	PROC4
CS 6	**Mixing operations (open systems), With potential for aerosol generation**	PROC5
CS 7	**Transfer from/pouring from containers, Manual, Equipment cleaning and maintenance**	PROC8a
CS 8	**Drum/batch transfers, Bulk transfers**	PROC8b
CS 9	**Drum and small package filling**	PROC9
CS 10	**Production or preparation or articles by tabletting, compression, extrusion or pelletization**	PROC14
CS 11	**Laboratory activities**	PROC15

3.2. Conditions of use affecting exposure

3.2.1. Control of environmental exposure: Formulation into mixture (ERC2)

Amount used (or contained in articles), frequency and duration of use/exposure		
Emission days	:	300
Technical and organisational conditions and measures		
Prevent discharge of undissolved substance to or recover from onsite wastewater. Water - minimum efficiency of 96,53 %		
Conditions and measures related to sewage treatment plant		
STP type	:	Municipal sewage treatment plant

STP sludge treatment	:	Do not apply industrial sludge to natural soils.

Conditions and measures related to treatment of waste (including article waste)

Waste treatment	:	External treatment and disposal of waste should comply with applicable local and/or national regulations. External recovery and recycling of waste should comply with applicable local and/or national regulations.

Other conditions affecting environmental exposure

Receiving surface water flow	:	18.000 m3/d
Local freshwater dilution factor	:	10
Local marine water dilution factor	:	100

3.2.2. Control of worker exposure: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions (PROC1)

Product (article) characteristics

Covers percentage substance in the product up to 100 %.

Physical form of product	:	Liquid, vapour pressure > 10 kPa at Standard Temperature and Pressure

Amount used (or contained in articles), frequency and duration of use/exposure

Duration	:	Covers daily exposures up to 8 hours

Technical and organisational conditions and measures

No specific measures identified.

Other conditions affecting workers exposure

Temperature	:	Assumes use at not more than 20°C above ambient temperature.

3.2.3. Control of worker exposure: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)

Product (article) characteristics

Covers percentage substance in the product up to 100 %.

Physical form of product	:	Liquid, vapour pressure > 10 kPa at Standard Temperature and Pressure

Amount used (or contained in articles), frequency and duration of use/exposure

Duration	:	Covers daily exposures up to 8 hours

Technical and organisational conditions and measures		
No specific measures identified.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.

3.2.4. Control of worker exposure: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)

Product (article) characteristics		
Covers percentage substance in the product up to 100 %.		
Physical form of product	:	Liquid, vapour pressure > 10 kPa at Standard Temperature and Pressure
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
No specific measures identified.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.

3.2.5. Control of worker exposure: Chemical production where opportunity for exposure arises (PROC4)

Product (article) characteristics		
Covers percentage substance in the product up to 100 %.		
Physical form of product	:	Liquid, vapour pressure > 10 kPa at Standard Temperature and Pressure
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
No specific measures identified.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient

temperature.

3.2.6. Control of worker exposure: Mixing or blending in batch processes (PROC5)

Product (article) characteristics		
Covers percentage substance in the product up to 100 %.		
Physical form of product	:	Liquid, vapour pressure > 10 kPa at Standard Temperature and Pressure
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
Provide extract ventilation to points where emissions occur.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.

3.2.7. Control of worker exposure: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities (PROC8a)

Product (article) characteristics		
Covers percentage substance in the product up to 100 %.		
Physical form of product	:	Liquid, vapour pressure > 10 kPa at Standard Temperature and Pressure
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
Provide extract ventilation to points where emissions occur. Drain down and flush system prior to equipment break-in or maintenance.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.

3.2.8. Control of worker exposure: Transfer of substance or mixture (charging/discharging) at dedicated facilities (PROC8b)

Product (article) characteristics

Covers percentage substance in the product up to 100 %.		
Physical form of product	:	Liquid, vapour pressure > 10 kPa at Standard Temperature and Pressure
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
No specific measures identified.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.

3.2.9. Control of worker exposure: Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC9)

Product (article) characteristics		
Covers percentage substance in the product up to 100 %.		
Physical form of product	:	Liquid, vapour pressure > 10 kPa at Standard Temperature and Pressure
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
Ensure material transfers are under containment or extract ventilation.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.

3.2.10. Control of worker exposure: Tabletting, compression, extrusion, pelettisation, granulation (PROC14)

Product (article) characteristics		
Covers percentage substance in the product up to 100 %.		
Physical form of product	:	Liquid, vapour pressure > 10 kPa at Standard Temperature and Pressure
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours

Technical and organisational conditions and measures
Provide extract ventilation to points where emissions occur.
Other conditions affecting workers exposure
Temperature : Assumes use at not more than 20°C above ambient temperature.

3.2.11. Control of worker exposure: Use as laboratory reagent (PROC15)

Product (article) characteristics
Covers percentage substance in the product up to 100 %.
Physical form of product : Liquid, vapour pressure > 10 kPa at Standard Temperature and Pressure
Amount used (or contained in articles), frequency and duration of use/exposure
Duration : Covers daily exposures up to 8 hours
Technical and organisational conditions and measures
No specific measures identified.
Other conditions affecting workers exposure
Temperature : Assumes use at not more than 20°C above ambient temperature.

3.3. Exposure estimation and reference to its source

3.3.1. Environmental release and exposure: Formulation into mixture (ERC2)

Protection Target	Exposure estimate	RCR
Freshwater	0,0046 mg/l (EUSES)	0,022
Sea water	0,411 µg/l (EUSES)	0,002
Freshwater sediment	0,0806 mg/kg wet weight (EUSES)	0,022
Sea sediment	0,0072 mg/kg wet weight (EUSES)	0,009
Soil	0,0372 mg/kg wet weight (EUSES)	0,013
Air	0,0396 mg/m³	

3.3.2. Worker exposure: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions (PROC1)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	Long-term	0,01 ppm (ECETOC TRA worker v3)	0,00
dermal	systemic	Long-term	0,34 mg/kg/d (ECETOC TRA worker v3)	0,00
combined routes			(ECETOC TRA worker v3)	0,00

3.3.3. Worker exposure: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	Long-term	50 ppm (ECETOC TRA worker v3)	0,25
dermal	systemic	Long-term	1,37 mg/kg/d (ECETOC TRA worker v3)	0,00
combined routes			(ECETOC TRA worker v3)	0,25

3.3.4. Worker exposure: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	Long-term	100 ppm (ECETOC TRA worker v3)	0,50
dermal	systemic	Long-term	0,34 mg/kg/d (ECETOC TRA worker v3)	0,00
combined routes			(ECETOC TRA worker v3)	0,50

3.3.5. Worker exposure: Chemical production where opportunity for exposure arises (PROC4)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	Long-term	100 ppm (ECETOC TRA worker v3)	0,50
dermal	systemic	Long-term	6,86 mg/kg/d (ECETOC TRA worker v3)	0,00
combined routes			(ECETOC TRA worker v3)	0,50

3.3.6. Worker exposure: Mixing or blending in batch processes (PROC5)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	Long-term	25 ppm (ECETOC TRA worker v3)	0,13
dermal	systemic	Long-term	0,07 mg/kg/d (ECETOC TRA worker v3)	0,00
combined routes			(ECETOC TRA worker v3)	0,13

3.3.7. Worker exposure: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities (PROC8a)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	Long-term	25 ppm (ECETOC TRA worker v3)	0,13
dermal	systemic	Long-term	0,14 mg/kg/d (ECETOC TRA worker v3)	0,00
combined routes			(ECETOC TRA worker v3)	0,13
inhalative	systemic	Long-term	25 ppm (ECETOC TRA worker v3)	0,13
dermal	systemic	Long-term	13,71 mg/kg/d (ECETOC TRA worker v3)	0,01
combined routes			(ECETOC TRA worker v3)	0,13

3.3.8. Worker exposure: Transfer of substance or mixture (charging/discharging) at dedicated facilities (PROC8b)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	Long-term	150 ppm (ECETOC TRA worker v3)	0,75
dermal	systemic	Long-term	6,86 mg/kg/d (ECETOC TRA worker v3)	0,00
combined routes			(ECETOC TRA worker v3)	0,75

3.3.9. Worker exposure: Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC9)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	Long-term	14 ppm (ECETOC TRA worker v3)	0,70
dermal	systemic	Long-term	0,69 mg/kg/d (ECETOC TRA worker v3)	0,00
combined routes			(ECETOC TRA worker v3)	0,70

3.3.10. Worker exposure: Tabletting, compression, extrusion, pelettisation, granulation (PROC14)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	Long-term	175 ppm (ECETOC TRA worker v3)	0,88
dermal	systemic	Long-term	0,34 mg/kg/d (ECETOC TRA worker v3)	0,00
combined routes			(ECETOC TRA worker v3)	0,88

3.3.11. Worker exposure: Use as laboratory reagent (PROC15)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	Long-term	50 ppm (ECETOC TRA worker v3)	0,25
dermal	systemic	Long-term	0,34 mg/kg/d (ECETOC TRA worker v3)	0,00
combined routes			(ECETOC TRA worker v3)	0,25

3.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposures are not expected to exceed the predicted DNELs and the resulting risk characterisation ratios are expected to be less than 1
When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposures are not expected to exceed the predicted PNECs and the resulting risk characterization ratios are expected to be less than 1.
Confirm that RMMs and OCs are as described or of equivalent efficiency.

ES 4: Use in coatings – industrial; Industrial uses (SU3).

4.1. Title section

Exposure Scenario name	:	Use in coatings – industrial
Structured Short Title	:	Use in coatings – industrial; Industrial uses (SU3).
Substance	:	cyclohexane EC-No.: 203-806-2

Environment		
CS 1	**Use in coatings – industrial**	ERC4
Worker		
CS 2	**General exposures (closed systems)**	PROC1
CS 3	**General exposures (closed systems), Use in contained systems, with sample collection, Storage, Film formation - force drying (50 - 100°C). Stoving (>100°C). UV/EB radiation curing, Product sampling**	PROC2
CS 4	**Mixing operations, General exposures (closed systems)**	PROC3
CS 5	**Film formation - air drying**	PROC4
CS 6	**Mixing operations (open systems), Preparation of material for application**	PROC5
CS 7	**Spraying (automatic/robotic), Manual, Spraying**	PROC7
CS 8	**Material transfers, Non-dedicated facility, Equipment cleaning and maintenance**	PROC8a
CS 9	**Material transfers, Dedicated facility**	PROC8b
CS 10	**Material transfers, Drum/batch transfers, Transfer from/pouring from containers**	PROC9
CS 11	**Roller, spreader, flow application**	PROC10
CS 12	**Dipping, immersion and pouring**	PROC13
CS 13	**Production or preparation or articles by tabletting, compression, extrusion or pelletization**	PROC14
CS 14	**Laboratory activities**	PROC15

4.2. Conditions of use affecting exposure

4.2.1. Control of environmental exposure: Industrial use of processing aids in processes and products, not becoming part of articles (ERC4)

Amount used (or contained in articles), frequency and duration of use/exposure		
Emission days	:	100
Conditions and measures related to sewage treatment plant		

STP type	:	Municipal sewage treatment plant
STP sludge treatment	:	Do not apply industrial sludge to natural soils.

Conditions and measures related to treatment of waste (including article waste)

Waste treatment	:	During manufacturing no waste of the substance is generated.

Other conditions affecting environmental exposure

Receiving surface water flow	:	18.000 m3/d
Local freshwater dilution factor	:	10
Local marine water dilution factor	:	100

4.2.2. Control of worker exposure: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions (PROC1)

Product (article) characteristics

Covers percentage substance in the product up to 100 %.

Physical form of product	:	Liquid, vapour pressure > 10 kPa at Standard Temperature and Pressure

Amount used (or contained in articles), frequency and duration of use/exposure

Duration	:	Covers daily exposures up to 8 hours

Technical and organisational conditions and measures

No specific measures identified.

Other conditions affecting workers exposure

Temperature	:	Assumes use at not more than 20°C above ambient temperature.

4.2.3. Control of worker exposure: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)

Product (article) characteristics

Covers percentage substance in the product up to 100 %.

Physical form of product	:	Liquid, vapour pressure > 10 kPa at Standard Temperature and Pressure

Amount used (or contained in articles), frequency and duration of use/exposure

Duration	:	Covers daily exposures up to 8 hours

Technical and organisational conditions and measures

No specific measures identified.
Other conditions affecting workers exposure

Temperature	:	Assumes use at not more than 20°C above ambient temperature.

4.2.4. Control of worker exposure: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)

Product (article) characteristics
Covers percentage substance in the product up to 100 %.

Physical form of product	:	Liquid, vapour pressure > 10 kPa at Standard Temperature and Pressure

Amount used (or contained in articles), frequency and duration of use/exposure

Duration	:	Covers daily exposures up to 8 hours

Technical and organisational conditions and measures
No specific measures identified.
Other conditions affecting workers exposure

Temperature	:	Assumes use at not more than 20°C above ambient temperature.

4.2.5. Control of worker exposure: Chemical production where opportunity for exposure arises (PROC4)

Product (article) characteristics
Covers percentage substance in the product up to 100 %.

Physical form of product	:	Liquid, vapour pressure > 10 kPa at Standard Temperature and Pressure

Amount used (or contained in articles), frequency and duration of use/exposure

Duration	:	Covers daily exposures up to 8 hours

Technical and organisational conditions and measures
No specific measures identified.
Other conditions affecting workers exposure

Temperature	:	Assumes use at not more than 20°C above ambient temperature.

4.2.6. Control of worker exposure: Mixing or blending in batch processes (PROC5)

Product (article) characteristics		
Covers percentage substance in the product up to 100 %.		
Physical form of product	:	Liquid, vapour pressure > 10 kPa at Standard Temperature and Pressure
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
Provide extract ventilation to points where emissions occur.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.

4.2.7. Control of worker exposure: Industrial spraying (PROC7)

Product (article) characteristics		
Covers percentage substance in the product up to 100 %.		
Physical form of product	:	Liquid, vapour pressure > 10 kPa at Standard Temperature and Pressure
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
Provide a good standard of controlled ventilation (10 to 15 air changes per hour). Apply within a vented cab supplied with filtered air under positive pressure and with a protection factor of >20.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.

4.2.8. Control of worker exposure: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities (PROC8a)

Product (article) characteristics		
Covers percentage substance in the product up to 100 %.		
Physical form of product	:	Liquid, vapour pressure > 10 kPa at Standard Temperature and Pressure

Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
Provide extract ventilation to points where emissions occur. Drain down system prior to equipment break-in or maintenance.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.

4.2.9. Control of worker exposure: Transfer of substance or mixture (charging/discharging) at dedicated facilities (PROC8b)

Product (article) characteristics		
Covers percentage substance in the product up to 100 %.		
Physical form of product	:	Liquid, vapour pressure > 10 kPa at Standard Temperature and Pressure
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
Ensure material transfers are under containment or extract ventilation.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.

4.2.10. Control of worker exposure: Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC9)

Product (article) characteristics		
Covers percentage substance in the product up to 100 %.		
Physical form of product	:	Liquid, vapour pressure > 10 kPa at Standard Temperature and Pressure
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
Provide extract ventilation to points where emissions occur.		

Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.

4.2.11. Control of worker exposure: Roller application or brushing (PROC10)

Product (article) characteristics		
Covers percentage substance in the product up to 100 %.		
Physical form of product	:	Liquid, vapour pressure > 10 kPa at Standard Temperature and Pressure
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
Provide extract ventilation to points where emissions occur.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.

4.2.12. Control of worker exposure: Treatment of articles by dipping and pouring (PROC13)

Product (article) characteristics		
Covers percentage substance in the product up to 100 %.		
Physical form of product	:	Liquid, vapour pressure > 10 kPa at Standard Temperature and Pressure
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
Provide extract ventilation to points where emissions occur.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.

4.2.13. Control of worker exposure: Tabletting, compression, extrusion, pelettisation, granulation (PROC14)

Product (article) characteristics		
Covers percentage substance in the product up to 100 %.		
Physical form of product	:	Liquid, vapour pressure > 10 kPa at Standard Temperature and Pressure
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
Provide extract ventilation to points where emissions occur.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.

4.2.14. Control of worker exposure: Use as laboratory reagent (PROC15)

Product (article) characteristics		
Covers percentage substance in the product up to 100 %.		
Physical form of product	:	Liquid, vapour pressure > 10 kPa at Standard Temperature and Pressure
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
Handle in a fume cupboard or under extract ventilation.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.

4.3. Exposure estimation and reference to its source

4.3.1. Environmental release and exposure: Industrial use of processing aids in processes and products, not becoming part of articles (ERC4)

Protection Target	Exposure estimate	RCR
Freshwater	0,0003 mg/l (EUSES)	0,001
Sea water	0,023 µg/l (EUSES)	0,000
Freshwater sediment	0,005 mg/kg wet weight (EUSES)	0,001

Sea sediment	0,0004 mg/kg wet weight (EUSES)	0,001
Soil	0,0013 mg/kg wet weight (EUSES)	0,000
Air	0,154 mg/m³	

4.3.2. Worker exposure: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions (PROC1)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	Long-term	0,01 ppm (ECETOC TRA worker v3)	0,00
dermal	systemic	Long-term	0,34 mg/kg/d (ECETOC TRA worker v3)	0,00
combined routes			(ECETOC TRA worker v3)	0,00

4.3.3. Worker exposure: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	Long-term	50 ppm (ECETOC TRA worker v3)	0,25
dermal	systemic	Long-term	1,37 mg/kg/d (ECETOC TRA worker v3)	0,00
combined routes			(ECETOC TRA worker v3)	0,25

4.3.4. Worker exposure: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	Long-term	100 ppm (ECETOC TRA worker v3)	0,50
dermal	systemic	Long-term	0,34 mg/kg/d (ECETOC TRA worker v3)	0,00
combined routes			(ECETOC TRA worker v3)	0,50

4.3.5. Worker exposure: Chemical production where opportunity for exposure arises (PROC4)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	Long-term	100 ppm (ECETOC TRA worker v3)	0,50
dermal	systemic	Long-term	6,86 mg/kg/d (ECETOC TRA worker v3)	0,00
combined routes			(ECETOC TRA worker v3)	0,50

4.3.6. Worker exposure: Mixing or blending in batch processes (PROC5)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	Long-term	25 ppm (ECETOC TRA worker v3)	0,13
dermal	systemic	Long-term	0,07 mg/kg/d (ECETOC TRA worker v3)	0,00
combined routes			(ECETOC TRA worker v3)	0,13

4.3.7. Worker exposure: Industrial spraying (PROC7)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	Long-term	25 ppm (ECETOC TRA worker v3)	0,13
dermal	systemic	Long-term	2,14 mg/kg/d (ECETOC TRA worker v3)	0,00
combined routes			(ECETOC TRA worker v3)	0,13
inhalative	systemic	Long-term	150 ppm (ECETOC TRA worker v3)	0,75
dermal	systemic	Long-term	42,86 mg/kg/d (ECETOC TRA worker v3)	0,02
combined routes			(ECETOC TRA worker v3)	0,77

4.3.8. Worker exposure: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities (PROC8a)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR

inhalative	systemic	Long-term	25 ppm (ECETOC TRA worker v3)	0,13
dermal	systemic	Long-term	2,14 mg/kg/d (ECETOC TRA worker v3)	0,00
combined routes			(ECETOC TRA worker v3)	0,13
inhalative	systemic	Long-term	35 ppm (ECETOC TRA worker v3)	0,18
dermal	systemic	Long-term	13,71 mg/kg/d (ECETOC TRA worker v3)	0,01
combined routes			(ECETOC TRA worker v3)	0,18

4.3.9. Worker exposure: Transfer of substance or mixture (charging/discharging) at dedicated facilities (PROC8b)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	Long-term	4,5 ppm (ECETOC TRA worker v3)	0,02
dermal	systemic	Long-term	0,69 mg/kg/d (ECETOC TRA worker v3)	0,00
combined routes			(ECETOC TRA worker v3)	0,02

4.3.10. Worker exposure: Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC9)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	Long-term	140 ppm (ECETOC TRA worker v3)	0,70
dermal	systemic	Long-term	0,69 mg/kg/d (ECETOC TRA worker v3)	0,00
combined routes			(ECETOC TRA worker v3)	0,70

4.3.11. Worker exposure: Roller application or brushing (PROC10)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	Long-term	175 ppm (ECETOC TRA worker v3)	0,88
dermal	systemic	Long-term	1,37 mg/kg/d	0,00

			(ECETOC TRA worker v3)	
combined routes			(ECETOC TRA worker v3)	0,88

4.3.12. Worker exposure: Treatment of articles by dipping and pouring (PROC13)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	Long-term	175 ppm (ECETOC TRA worker v3)	0,88
dermal	systemic	Long-term	0,69 mg/kg/d (ECETOC TRA worker v3)	0,00
combined routes			(ECETOC TRA worker v3)	0,88

4.3.13. Worker exposure: Tabletting, compression, extrusion, pelettisation, granulation (PROC14)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	Long-term	175 ppm (ECETOC TRA worker v3)	0,88
dermal	systemic	Long-term	0,34 mg/kg/d (ECETOC TRA worker v3)	0,00
combined routes			(ECETOC TRA worker v3)	0,88

4.3.14. Worker exposure: Use as laboratory reagent (PROC15)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	Long-term	35 ppm (ECETOC TRA worker v3)	0,18
dermal	systemic	Long-term	0,03 mg/kg/d (ECETOC TRA worker v3)	0,00
combined routes			(ECETOC TRA worker v3)	0,18

4.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposures are not expected to exceed the predicted DNELs and the resulting risk characterisation ratios are expected to be less than 1
Confirm that RMMs and OCs are as described or of equivalent efficiency.
When the recommended risk management measures (RMMs) and operational conditions (OCs) are

observed, exposures are not expected to exceed the predicted PNECs and the resulting risk characterization ratios are expected to be less than 1.
Not applicable

ES 5: Use in coatings – professional; Professional uses (SU22).

5.1. Title section

Exposure Scenario name	:	Use in coatings – professional
Structured Short Title	:	Use in coatings – professional; Professional uses (SU22).
Substance	:	cyclohexane EC-No.: 203-806-2

Environment		
CS 1	**Use in coatings – professional**	ERC8a, ERC8d
Worker		
CS 2	**General exposures (closed systems)**	PROC1
CS 3	**Filling of equipment from drums or containers, General exposures (closed systems), Use in contained systems, Storage, Product sampling**	PROC2
CS 4	**Preparation of material for application**	PROC3
CS 5	**Film formation - air drying, Outdoor, Film formation - air drying, Indoor**	PROC4
CS 6	**Preparation of material for application, Indoor, Preparation of material for application, Outdoor**	PROC5
CS 7	**Material transfers, Drum/batch transfers, Equipment cleaning and maintenance**	PROC8a
CS 8	**Material transfers, Drum/batch transfers**	PROC8b
CS 9	**Roller, spreader, flow application, Indoor, Roller, spreader, flow application, Outdoor**	PROC10
CS 10	**Manual, Spraying, Indoor, Manual, Spraying, Outdoor**	PROC11
CS 11	**Dipping, immersion and pouring, Indoor, Dipping, immersion and pouring, Outdoor**	PROC13
CS 12	**Laboratory activities**	PROC15
CS 13	**Hand application - finger-paints, pastels, adhesives, Indoor, Hand application - finger-paints, pastels, adhesives, Outdoor**	PROC9

5.2. Conditions of use affecting exposure

5.2.1. Control of environmental exposure: Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor) (ERC8a) / Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor) (ERC8d)

Amount used (or contained in articles), frequency and duration of use/exposure		
Emission days	:	365
Conditions and measures related to sewage treatment plant		

STP type	:	Municipal sewage treatment plant
STP effluent	:	2.000 m3/d

Conditions and measures related to treatment of waste (including article waste)

Waste treatment	:	External treatment and disposal of waste should comply with applicable local and/or national regulations. External recovery and recycling of waste should comply with applicable local and/or national regulations.

Other conditions affecting environmental exposure

Receiving surface water flow	:	18.000 m3/d
Local freshwater dilution factor	:	10
Local marine water dilution factor	:	100

5.2.2. Control of worker exposure: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions (PROC1)

Product (article) characteristics

Covers percentage substance in the product up to 100 %.

Physical form of product	:	Liquid, vapour pressure > 10 kPa at Standard Temperature and Pressure

Amount used (or contained in articles), frequency and duration of use/exposure

Duration	:	Covers daily exposures up to 8 hours

Technical and organisational conditions and measures

No specific measures identified.

Other conditions affecting workers exposure

Temperature	:	Assumes use at not more than 20°C above ambient temperature.

5.2.3. Control of worker exposure: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)

Product (article) characteristics

Covers percentage substance in the product up to 100 %.

Physical form of product	:	Liquid, vapour pressure > 10 kPa at Standard Temperature and Pressure

Amount used (or contained in articles), frequency and duration of use/exposure

Duration	:	Covers daily exposures up to 8 hours

Technical and organisational conditions and measures		
No specific measures identified.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.

5.2.4. Control of worker exposure: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)

Product (article) characteristics		
Covers percentage substance in the product up to 100 %.		
Physical form of product	:	Liquid, vapour pressure > 10 kPa at Standard Temperature and Pressure
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
No specific measures identified.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.

5.2.5. Control of worker exposure: Chemical production where opportunity for exposure arises (PROC4)

Product (article) characteristics		
Covers percentage substance in the product up to 100 %.		
Physical form of product	:	Liquid, vapour pressure > 10 kPa at Standard Temperature and Pressure
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
Ensure operation is undertaken outdoors. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan.		
Other conditions affecting workers exposure		

Temperature	:	Assumes use at not more than 20°C above ambient temperature.

5.2.6. Control of worker exposure: Mixing or blending in batch processes (PROC5)

Product (article) characteristics		
Covers percentage substance in the product up to 100 %.		
Physical form of product	:	Liquid, vapour pressure > 10 kPa at Standard Temperature and Pressure
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
Provide a good standard of controlled ventilation (10 to 15 air changes per hour). Ensure operation is undertaken outdoors.		
Conditions and measures related to personal protection, hygiene and health evaluation		
Wear a respirator conforming to EN140 with Type A filter or better.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.

5.2.7. Control of worker exposure: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities (PROC8a)

Product (article) characteristics		
Covers percentage substance in the product up to 100 %.		
Physical form of product	:	Liquid, vapour pressure > 10 kPa at Standard Temperature and Pressure
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
Provide a good standard of controlled ventilation (10 to 15 air changes per hour). Drain down system prior to equipment break-in or maintenance.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.

5.2.8. Control of worker exposure: Transfer of substance or mixture (charging/discharging) at dedicated facilities (PROC8b)

Product (article) characteristics		
Covers percentage substance in the product up to 100 %.		
Physical form of product	:	Liquid, vapour pressure > 10 kPa at Standard Temperature and Pressure
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
Ensure material transfers are under containment or extract ventilation.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.

5.2.9. Control of worker exposure: Roller application or brushing (PROC10)

Product (article) characteristics		
Covers percentage substance in the product up to 100 %.		
Physical form of product	:	Liquid, vapour pressure > 10 kPa at Standard Temperature and Pressure
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
Provide a good standard of controlled ventilation (10 to 15 air changes per hour). Ensure operation is undertaken outdoors.		
Conditions and measures related to personal protection, hygiene and health evaluation		
Wear a respirator conforming to EN140 with Type A filter or better.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.

5.2.10. Control of worker exposure: Non-industrial spraying (PROC11)

Product (article) characteristics

Covers percentage substance in the product up to 100 %.		
Physical form of product	:	Liquid, vapour pressure > 10 kPa at Standard Temperature and Pressure
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
Carry out in a vented booth or extracted enclosure. Limit the substance content in the product to 5 %. Ensure operation is undertaken outdoors.		
Conditions and measures related to personal protection, hygiene and health evaluation		
Wear a respirator conforming to EN140 with Type A filter or better.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.

5.2.11. Control of worker exposure: Treatment of articles by dipping and pouring (PROC13)

Product (article) characteristics		
Covers percentage substance in the product up to 100 %.		
Physical form of product	:	Liquid, vapour pressure > 10 kPa at Standard Temperature and Pressure
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
Provide extract ventilation to points where emissions occur. Ensure operation is undertaken outdoors.		
Conditions and measures related to personal protection, hygiene and health evaluation		
Wear a respirator conforming to EN140 with Type A filter or better.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.

5.2.12. Control of worker exposure: Use as laboratory reagent (PROC15)

Product (article) characteristics		

Covers percentage substance in the product up to 100 %.		
Physical form of product	:	Liquid, vapour pressure > 10 kPa at Standard Temperature and Pressure
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
Provide extract ventilation to points where emissions occur.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.

5.2.13. Control of worker exposure: Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC9)

Product (article) characteristics		
Covers percentage substance in the product up to 100 %.		
Physical form of product	:	Liquid, vapour pressure > 10 kPa at Standard Temperature and Pressure
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
Provide a good standard of controlled ventilation (10 to 15 air changes per hour). Ensure operation is undertaken outdoors.		
Conditions and measures related to personal protection, hygiene and health evaluation		
Wear a respirator conforming to EN140 with Type A filter or better.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.

5.3. Exposure estimation and reference to its source

5.3.1. Environmental release and exposure: Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor) (ERC8a) / Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor) (ERC8d)

Protection Target	Exposure estimate	RCR

Freshwater	0,309 µg/m3 (EUSES)	0,001
Sea water	0,0256 µg/l (EUSES)	0,000
Freshwater sediment	0,0054 mg/kg wet weight (EUSES)	0,001
Sea sediment	0,448 µg/kg wet weight (EUSES)	0,000
Soil	0,343 µg/kg wet weight (EUSES)	0,000
Air	0,276 µg/m3	

5.3.2. Worker exposure: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions (PROC1)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	Long-term	0,10 ppm (ECETOC TRA worker v3)	0,00
dermal	systemic	Long-term	0,34 mg/kg/d (ECETOC TRA worker v3)	0,00
combined routes			(ECETOC TRA worker v3)	0,00

5.3.3. Worker exposure: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	Long-term	50 ppm (ECETOC TRA worker v3)	0,25
dermal	systemic	Long-term	1,37 mg/kg/d (ECETOC TRA worker v3)	0,00
combined routes			(ECETOC TRA worker v3)	0,25

5.3.4. Worker exposure: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	Long-term	0,10 ppm (ECETOC TRA worker v3)	0,00
dermal	systemic	Long-term	0,34 mg/kg/d (ECETOC TRA worker v3)	0,00
combined routes			(ECETOC TRA	0,00

			worker v3)	

5.3.5. Worker exposure: Chemical production where opportunity for exposure arises (PROC4)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	Long-term	175 ppm (ECETOC TRA worker v3)	0,88
dermal	systemic	Long-term	6,86 mg/kg/d (ECETOC TRA worker v3)	0,00
combined routes			(ECETOC TRA worker v3)	0,88

5.3.6. Worker exposure: Mixing or blending in batch processes (PROC5)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	Long-term	150 ppm (ECETOC TRA worker v3)	0,75
dermal	systemic	Long-term	13,71 mg/kg/d (ECETOC TRA worker v3)	0,01
combined routes			(ECETOC TRA worker v3)	0,76
inhalative	systemic	Long-term	70 ppm (ECETOC TRA worker v3)	0,35
dermal	systemic	Long-term	13,71 mg/kg/d (ECETOC TRA worker v3)	0,01
combined routes			(ECETOC TRA worker v3)	0,36

5.3.7. Worker exposure: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities (PROC8a)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	Long-term	150 ppm (ECETOC TRA worker v3)	0,75
dermal	systemic	Long-term	13,71 mg/kg/d (ECETOC TRA worker v3)	0,01
combined routes			(ECETOC TRA worker v3)	0,76
inhalative	systemic	Long-term	50 ppm (ECETOC TRA worker v3)	0,25
dermal	systemic	Long-term	13,71 mg/kg/d	0,01

			(ECETOC TRA worker v3)	
combined routes			(ECETOC TRA worker v3)	0,26

5.3.8. Worker exposure: Transfer of substance or mixture (charging/discharging) at dedicated facilities (PROC8b)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	Long-term	25 ppm (ECETOC TRA worker v3)	0,13
dermal	systemic	Long-term	0,69 mg/kg/d (ECETOC TRA worker v3)	0,00
combined routes			(ECETOC TRA worker v3)	0,13

5.3.9. Worker exposure: Roller application or brushing (PROC10)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	Long-term	150 ppm (ECETOC TRA worker v3)	0,75
dermal	systemic	Long-term	27,43 mg/kg/d (ECETOC TRA worker v3)	0,01
combined routes			(ECETOC TRA worker v3)	0,76
inhalative	systemic	Long-term	35 ppm (ECETOC TRA worker v3)	0,18
dermal	systemic	Long-term	27,43 mg/kg/d (ECETOC TRA worker v3)	0,01
combined routes			(ECETOC TRA worker v3)	0,19

5.3.10. Worker exposure: Non-industrial spraying (PROC11)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	Long-term	50 ppm (ECETOC TRA worker v3)	0,25
dermal	systemic	Long-term	2,14 mg/kg/d (ECETOC TRA worker v3)	0,00
combined routes			(ECETOC TRA worker v3)	0,25

inhalative	systemic	Long-term	70 ppm (ECETOC TRA worker v3)	0,35
dermal	systemic	Long-term	107,14 mg/kg/d (ECETOC TRA worker v3)	0,05
combined routes			(ECETOC TRA worker v3)	0,40

5.3.11. Worker exposure: Treatment of articles by dipping and pouring (PROC13)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	Long-term	50 ppm (ECETOC TRA worker v3)	0,25
dermal	systemic	Long-term	0,69 mg/kg/d (ECETOC TRA worker v3)	0,00
combined routes			(ECETOC TRA worker v3)	0,25
inhalative	systemic	Long-term	175 ppm (ECETOC TRA worker v3)	0,88
dermal	systemic	Long-term	13,71 mg/kg/d (ECETOC TRA worker v3)	0,01
combined routes			(ECETOC TRA worker v3)	0,88

5.3.12. Worker exposure: Use as laboratory reagent (PROC15)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	Long-term	10 ppm (ECETOC TRA worker v3)	0,05
dermal	systemic	Long-term	0,03 mg/kg/d (ECETOC TRA worker v3)	0,00
combined routes			(ECETOC TRA worker v3)	0,05

5.3.13. Worker exposure: Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC9)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	Long-term	35 ppm (ECETOC TRA worker v3)	0,18
inhalative	systemic	Long-term	150 ppm (ECETOC TRA worker v3)	0,75

dermal	systemic	Long-term	141,43 mg/kg/d (ECETOC TRA worker v3)	0,07
dermal	systemic	Long-term	141,43 mg/kg/d (ECETOC TRA worker v3)	0,07
combined routes			(ECETOC TRA worker v3)	0,25
combined routes			(ECETOC TRA worker v3)	0,82

5.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposures are not expected to exceed the predicted DNELs and the resulting risk characterisation ratios are expected to be less than 1
Confirm that RMMs and OCs are as described or of equivalent efficiency.
When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposures are not expected to exceed the predicted PNECs and the resulting risk characterization ratios are expected to be less than 1.
Not applicable

ES 6: Use as a cleaning agent – industrial; Industrial uses (SU3).

6.1. Title section

Exposure Scenario name	:	Use as a cleaning agent – industrial
Structured Short Title	:	Use as a cleaning agent – industrial; Industrial uses (SU3).
Substance	:	cyclohexane EC-No.: 203-806-2

Environment		
CS 1	**Use as a cleaning agent – industrial**	ERC4
Worker		
CS 2	**General exposures**	PROC1
CS 3	**Automated process with (semi) closed systems, Use in contained systems, Application of cleaning products in closed systems, Storage, Product sampling**	PROC2
CS 4	**Automated process with (semi) closed systems, Use in contained systems, Drum/batch transfers, Use in contained systems**	PROC3
CS 5	**Use in contained batch processes, Treatment by heating**	PROC4
CS 6	**Cleaning with high pressure washers**	PROC7
CS 7	**Bulk transfers, Equipment cleaning and maintenance**	PROC8a
CS 8	**Filling of equipment from drums or containers, Dedicated facility**	PROC8b
CS 9	**Cleaning with low-pressure washers, Manual, Surfaces, Cleaning, No spraying**	PROC10
CS 10	**Degreasing small objects in cleaning station**	PROC13

6.2. Conditions of use affecting exposure

6.2.1. Control of environmental exposure: Industrial use of processing aids in processes and products, not becoming part of articles (ERC4)

Amount used (or contained in articles), frequency and duration of use/exposure		
Emission days	:	100
Technical and organisational conditions and measures		
Prevent discharge of undissolved substance to or recover from onsite wastewater. Soil emission controls are not applicable as there is no direct release to soil. Air - minimum efficiency of 70 % Water - minimum efficiency of 96,53 %		
Conditions and measures related to sewage treatment plant		
STP type	:	Municipal sewage treatment plant

STP effluent	:	20.000 m3/d

Conditions and measures related to treatment of waste (including article waste)

Waste treatment	:	External treatment and disposal of waste should comply with applicable local and/or national regulations. External recovery and recycling of waste should comply with applicable local and/or national regulations.

Other conditions affecting environmental exposure

Receiving surface water flow	:	18.000 m3/d
Local freshwater dilution factor	:	10
Local marine water dilution factor	:	100

6.2.2. Control of worker exposure: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions (PROC1)

Product (article) characteristics

Covers percentage substance in the product up to 100 %.

Physical form of product	:	Liquid, vapour pressure > 10 kPa at Standard Temperature and Pressure

Amount used (or contained in articles), frequency and duration of use/exposure

Duration	:	Covers daily exposures up to 8 hours

Technical and organisational conditions and measures

No specific measures identified.

Other conditions affecting workers exposure

Temperature	:	Assumes use at not more than 20°C above ambient temperature.

6.2.3. Control of worker exposure: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)

Product (article) characteristics

Covers percentage substance in the product up to 100 %.

Physical form of product	:	Liquid, vapour pressure > 10 kPa at Standard Temperature and Pressure

Amount used (or contained in articles), frequency and duration of use/exposure

Duration	:	Covers daily exposures up to 8 hours

Technical and organisational conditions and measures		
No specific measures identified.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.

6.2.4. Control of worker exposure: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)

Product (article) characteristics		
Covers percentage substance in the product up to 100 %.		
Physical form of product	:	Liquid, vapour pressure > 10 kPa at Standard Temperature and Pressure
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
No specific measures identified.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.

6.2.5. Control of worker exposure: Chemical production where opportunity for exposure arises (PROC4)

Product (article) characteristics		
Covers percentage substance in the product up to 100 %.		
Physical form of product	:	Liquid, vapour pressure > 10 kPa at Standard Temperature and Pressure
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
No specific measures identified.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient

temperature.

6.2.6. Control of worker exposure: Industrial spraying (PROC7)

Product (article) characteristics		
Covers percentage substance in the product up to 100 %.		
Physical form of product	:	Liquid, vapour pressure > 10 kPa at Standard Temperature and Pressure
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
Provide a good standard of controlled ventilation (10 to 15 air changes per hour).		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.

6.2.7. Control of worker exposure: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities (PROC8a)

Product (article) characteristics		
Covers percentage substance in the product up to 100 %.		
Physical form of product	:	Liquid, vapour pressure > 10 kPa at Standard Temperature and Pressure
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
Ensure material transfers are under containment or extract ventilation. Drain down system prior to equipment break-in or maintenance.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.

6.2.8. Control of worker exposure: Transfer of substance or mixture (charging/discharging) at dedicated facilities (PROC8b)

Product (article) characteristics

Covers percentage substance in the product up to 100 %.		
Physical form of product	:	Liquid, vapour pressure > 10 kPa at Standard Temperature and Pressure
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
Ensure material transfers are under containment or extract ventilation.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.

6.2.9. Control of worker exposure: Roller application or brushing (PROC10)

Product (article) characteristics		
Covers percentage substance in the product up to 100 %.		
Physical form of product	:	Liquid, vapour pressure > 10 kPa at Standard Temperature and Pressure
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
Provide a good standard of controlled ventilation (10 to 15 air changes per hour).		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.

6.2.10. Control of worker exposure: Treatment of articles by dipping and pouring (PROC13)

Product (article) characteristics		
Covers percentage substance in the product up to 100 %.		
Physical form of product	:	Liquid, vapour pressure > 10 kPa at Standard Temperature and Pressure
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		

Provide extract ventilation to points where emissions occur.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.

6.3. Exposure estimation and reference to its source

6.3.1. Environmental release and exposure: Industrial use of processing aids in processes and products, not becoming part of articles (ERC4)

Protection Target	Exposure estimate	RCR
Freshwater	0,0003 mg/l (EUSES)	0,001
Sea water	0,0248 µg/l (EUSES)	0,000
Freshwater sediment	0,00527 mg/kg wet weight (EUSES)	0,001
Sea sediment	0,000434 mg/kg wet weight (EUSES)	0,001
Soil	0,00131 mg/kg wet weight (EUSES)	0,001

6.3.2. Worker exposure: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions (PROC1)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	Long-term	0,01 ppm (ECETOC TRA worker v3)	0,00
dermal	systemic	Long-term	0,34 mg/kg/d (ECETOC TRA worker v3)	0,00
combined routes			(ECETOC TRA worker v3)	0,00

6.3.3. Worker exposure: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	Long-term	50 ppm (ECETOC TRA worker v3)	0,25
dermal	systemic	Long-term	1,37 mg/kg/d (ECETOC TRA worker v3)	0,00
combined routes			(ECETOC TRA	0,25

			worker v3)	

6.3.4. Worker exposure: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	Long-term	100 ppm (ECETOC TRA worker v3)	0,50
dermal	systemic	Long-term	0,34 mg/kg/d (ECETOC TRA worker v3)	0,00
combined routes			(ECETOC TRA worker v3)	0,50

6.3.5. Worker exposure: Chemical production where opportunity for exposure arises (PROC4)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	Long-term	100 ppm (ECETOC TRA worker v3)	0,50
dermal	systemic	Long-term	0,69 mg/kg/d (ECETOC TRA worker v3)	0,00
combined routes			(ECETOC TRA worker v3)	0,50

6.3.6. Worker exposure: Industrial spraying (PROC7)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	Long-term	150 ppm (ECETOC TRA worker v3)	0,75
dermal	systemic	Long-term	42,86 mg/kg/d (ECETOC TRA worker v3)	0,02
combined routes			(ECETOC TRA worker v3)	0,77

6.3.7. Worker exposure: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities (PROC8a)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	Long-term	25 ppm (ECETOC TRA worker v3)	0,13
dermal	systemic	Long-term	0,14 mg/kg/d	0,00

			(ECETOC TRA worker v3)	
combined routes			(ECETOC TRA worker v3)	0,13
inhalative	systemic	Long-term	50 ppm (ECETOC TRA worker v3)	0,25
dermal	systemic	Long-term	13,71 mg/kg/d (ECETOC TRA worker v3)	0,01
combined routes			(ECETOC TRA worker v3)	0,26

6.3.8. Worker exposure: Transfer of substance or mixture (charging/discharging) at dedicated facilities (PROC8b)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	Long-term	4,5 ppm (ECETOC TRA worker v3)	0,02
dermal	systemic	Long-term	0,69 mg/kg/d (ECETOC TRA worker v3)	0,00
combined routes			(ECETOC TRA worker v3)	0,02

6.3.9. Worker exposure: Roller application or brushing (PROC10)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	Long-term	75 ppm (ECETOC TRA worker v3)	0,38
dermal	systemic	Long-term	27,43 mg/kg/d (ECETOC TRA worker v3)	0,01
combined routes			(ECETOC TRA worker v3)	0,39

6.3.10. Worker exposure: Treatment of articles by dipping and pouring (PROC13)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	Long-term	25 ppm (ECETOC TRA worker v3)	0,13
dermal	systemic	Long-term	0,69 mg/kg/d (ECETOC TRA worker v3)	0,00
combined routes			(ECETOC TRA worker v3)	0,13

6.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposures are not expected to exceed the predicted DNELs and the resulting risk characterisation ratios are expected to be less than 1
Confirm that RMMs and OCs are as described or of equivalent efficiency.
When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposures are not expected to exceed the predicted PNECs and the resulting risk characterization ratios are expected to be less than 1.