CHEMICAL SAFETY CRAN COURSE

CRAN COURSE – AGENDA

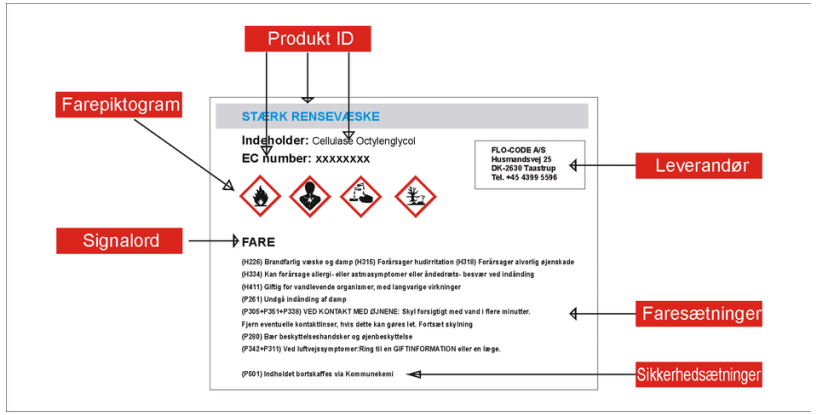
1. Introduction to hazardous chemicals - hazard label.
2. Safety Data Sheet (SDS/MSDS).
3. CRAN chemicals.
4. Examples from BCE.
5. Good advices for chemical.

SAFETY AND REGULATIONS

Regulation on the execution of work no. 1839 from 14. December 2023:

- **§ 4.** **The work must, at all stages, be planned and organized in such a way that it can be carried out in a completely safe and healthy manner.**
- **§8** In the execution of the work, **the age, insight, work ability** and other prerequisites of the **employee must be taken into account.**
- **§ 16.** **Unnecessary exposure to substances and materials must be avoided**. The impact of substances and materials at work must therefore be reduced as much as reasonable taking into account the technical progress, and the limit values given by Arbejdstilsynet must not be exceeded.
- **§ 18.** The employer must ensure that each **individual employee, regardless of the nature and duration of the employment relationship**, receives adequate and appropriate training and instruction in performing the work in a safe manner.
- **§20**. The employer must ensure that employees from **a foreign company,** who perform work at the company receive appropriate instruction about the safety and health conditions at the company that are important for their work.

IDENTIFICATION OF HAZARDOUS CHEMICALS



OVERVIEW OF HAZARD PICTOGRAMS

Physical hazards:

Explosives division 1.1
Explosives division 1.2
Explosives division 1.3
Explosives division 1.4
Explosives division 1.5
Explosives division 1.6

Flammable liquid, cat. 1, 2 and 3
Flammable solid, cat. 1 and 2

Oxidising liquid cat. 1, 2 and 3
Oxidising solid cat. 1, 2 and 3

Corrosive to metals

Gasses under pressure 4 groups
Compressed gas
Liquidfied gas
Refrigerated liquid gas
Dissolved gas

Health hazards.

Acute Tox. Oral cat. 1, 2 and 3
Akcute Tox. Dermal cat. 1, 2 and 3
Acute Tox. Inhalation kat. 1,2 and 3

STOT SE, cat. 1 and 2
STOR RE, cat. 1 and 2
Resp. Sens, cat 1, 1A and 1 B
Carc.
Mut.
Repr.
Asp. Tox.

Skin Corrosive , cat. 1
Eye Damage, cat. 1

Acute Tox. Oral cat. 4
Acute Tox. Dermal cat. 4
Acute Tox. Inhalation cat. 4
Skin Irritation , cat. 2
Eye Irritation, cat. 2
Skin Sens, cat. 1, 1 A and 1B
Ozone cat. 1

Environmental hazards:

Aq acute cat. 1.
Aq. chronic, cat 1 and 2

H- & P-STATEMENTS

H = Hazard - CLP - Annex III (Part I)

H200 – Physical hazards.
H250: Catches fire spontaneously if exposed to air.

H300- Health hazards.
H310: Fatal in contact with skin.

H400- Environmental hazards.
H401: Toxic to aquatic life.

P = Precaution (safety) - CLP - Annex IV (Part I)

P100 – 199 (General) - P102: Keep out of reach of children.

P200 – 299 (Prevention) - P230 Keep wetted with.

P300 – 399 (Response) - P310 Immediately call a poison center or doctor/physician.

P400 – 499 (Storage) - P402: Store in a dry place.

P500 – 599 (Disposal) - P501: Dispose of contents/container to **....**

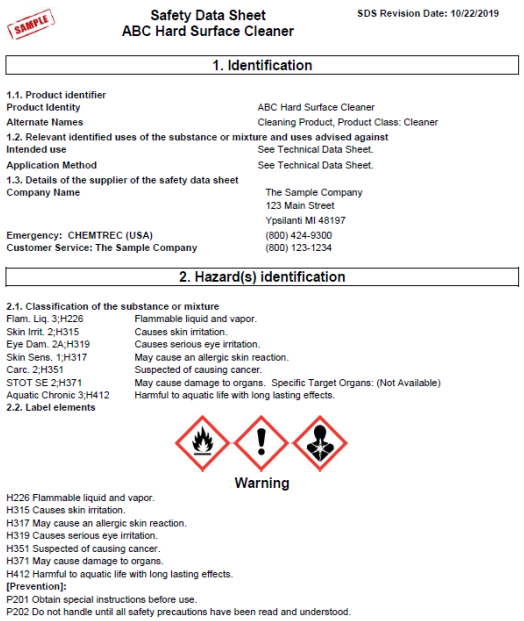
EUH-STATEMENTS – SUPPLEMENT

Introduced in order not to relax the EU's existing level of protection, which we knew before CLP.

Examples of EUH statements:

- EUH 029: Contact with water liberates toxic gas.
- EUH 066: Repeated exposure may cause skin dryness or cracking.
- EUH 071: Corrosive to the respiratory tract.
- EUH 380: May cause endocrine disrution in humans.
- EUH 430: May cause endocrine disrution in the environment.

SAFETY DATA SHEET:



SAMPLE

Safety Data Sheet
ABC Hard Surface Cleaner

SDS Revision Date: 10/22/2019

1. Identification

1.1. Product identifier

Product Identity	ABC Hard Surface Cleaner
Alternate Names	Cleaning Product, Product Class: Cleaner

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

Intended use	See Technical Data Sheet.
Application Method	See Technical Data Sheet.

1.3. Details of the supplier of the safety data sheet

Company Name	The Sample Company 123 Main Street Ypsilanti MI 48197
Emergency: CHEMTREC (USA)	(800) 424-9300
Customer Service: The Sample Company	(800) 123-1234

2. Hazard(s) identification

2.1. Classification of the substance or mixture

Flam. Liq. 3;H226	Flammable liquid and vapor.
Skin Irrit. 2;H315	Causes skin irritation.
Eye Dam. 2A;H319	Causes serious eye irritation.
Skin Sens. 1;H317	May cause an allergic skin reaction.
Carc. 2;H351	Suspected of causing cancer.
STOT SE 2;H371	May cause damage to organs. Specific Target Organs: (Not Available)
Aquatic Chronic 3;H412	Harmful to aquatic life with long lasting effects.

2.2. Label elements

Warning

H226 Flammable liquid and vapor.
H315 Causes skin irritation.
H317 May cause an allergic skin reaction.
H319 Causes serious eye irritation.
H351 Suspected of causing cancer.
H371 May cause damage to organs.
H412 Harmful to aquatic life with long lasting effects.
[Prevention]:
P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and understood.

A Safety Data Sheet, also known as SDS (Safety Data Sheet) or MSDS (Material Safety Data Sheet), is an important document for hazardous chemicals and products.

Protects the user:
Helps users of chemicals understand the potential hazards and by setting appropriate precautions, they can protect both humans and the environment.

Informs about the hazards:

Provides information on the hazards posed by a chemical, such as toxicity, fire hazard, reactivity, and chemical substances that can cause problems.

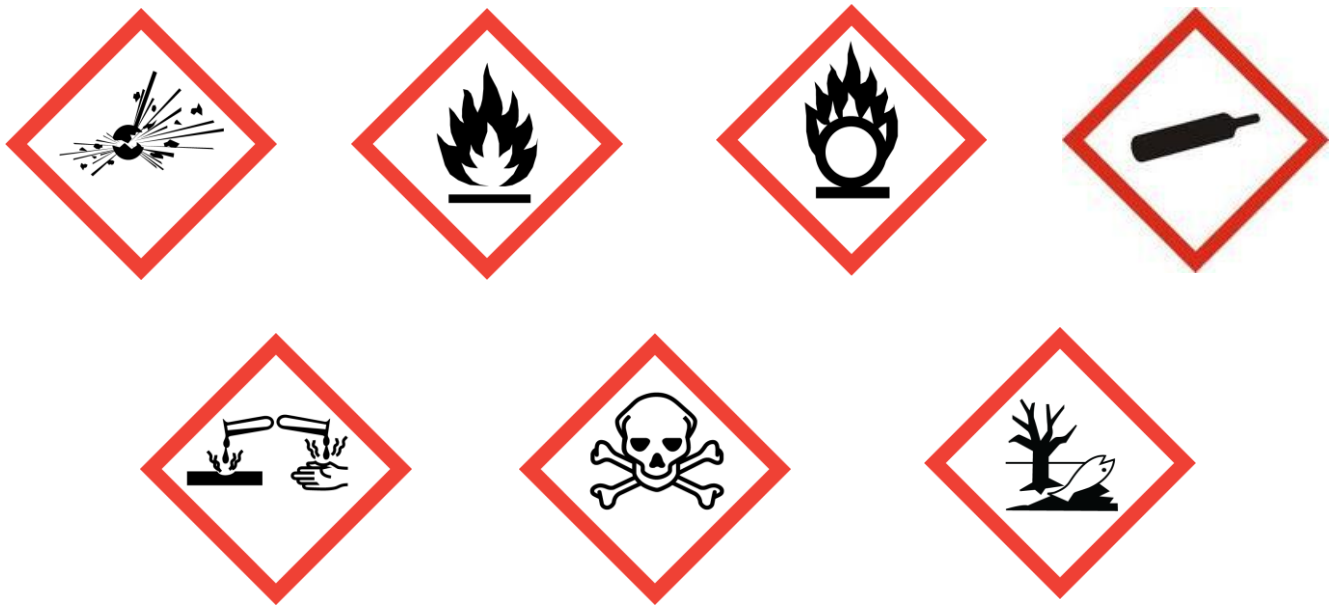
Indicates precautions:

Contains instructions on how to safely handle, store, use, and dispose of a chemical.

The supplier: It is a legal requirement that suppliers who sell chemicals are obliged to prepare and distribute SDSs for hazardous chemicals and products.

The user: Is responsible for obtaining, understanding and using correctly the hazardous chemicals as described in the SDS.

OBVIOUS HAZARDS



UNCLEAR HAZARDS

STOT SE, cat. 1 and 2
STOR RE, cat. 1 and 2
Resp. Sens, cat 1, 1A and 1 B
Carc.
Mut.
Repr.
Asp. Tox.

Acute Toxs. Oral cat. 4
Acute Tox. Dermal cat. 4
Acute Toxs. Inhalation cat. 4
Skin Irritation , cat. 2
Eye Irritation, cat. 2
Skin Sens, 1, 1 A and 1B
Ozone cat. 1

SAFETY DATA SHEET

SDS, section. **2.1 Classification** and section. **2.2 Labelling.**

SDS, section. **3 Composition/Information on ingredients**

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008
Flammable liquids (Category 2), H225
Eye irritation (Category 2), H319
Specific target organ toxicity - single exposure (Category 3), Central nervous system, H336

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

2.2 Label elements

Labelling according Regulation (EC) No 1272/2008
Pictogram

Signal Word Danger

Hazard statement(s)

H225	Highly flammable liquid and vapor.
H319	Causes serious eye irritation.
H336	May cause drowsiness or dizziness.

Precautionary statement(s)

P210	Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P233	Keep container tightly closed.
P240	Ground and bond container and receiving equipment.
P241	Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242	Use non-sparking tools.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

Supplemental Hazard information (EU)

EUH066	Repeated exposure may cause skin dryness or cracking.

SECTION 3: Composition/information on ingredients

3.1 Substances

Formula	:	C_3H_6O
Molecular weight	:	58,08 g/mol
CAS-No.	:	67-64-1
EC-No.	:	200-662-2
Index-No.	:	606-001-00-8

Component		Classification	Concentration
acetone			
CAS-No. EC-No. Index-No.	67-64-1 200-662-2 606-001-00-8	Flam. Liq. 2; Eye Irrit. 2; STOT SE 3; H225, H319, H336 Concentration limits: >= 20 %: STOT SE 3, H336;	<= 100 %

KRAN = CRAN

BECAUSE THERE ARE UNCLEAR HAZARDS, A FOCUS HAS BEEN PLACED ON VERY HAZARDOUS CHEMICALS.

A METHOD THAT YOU CAN USE TO AVOID LETTING HAZARDOUS CHEMICALS INTO THE UNIVERSITY IS TO MAKE A CRAN ASSESSMENT BEFORE PURCHASING A NEW CHEMICAL/SUBSTANCE/PRODUCT/MATERIAL/MIXTURE.

DEFINITION OF CRAN

CRAN-chemicals are a term for the most harmful and hazardous chemical substances in the working environment. Depending on their harmful effects, CRAN substances are divided into four categories.

What is CRAN short for?

C = carcinogenic
R = Reproductive harmful (fetal harmful and/or devastating in the formation of functional egg and sperm)
A = Allergenic
N = Neuro toxic (damages the brain and nervous system)

Some substances appear on several lists, e.g. organic solvents, which can have both brain-damaging effects in adults and foetuses (N) as well as harmful effects on women's ability to have children (R).

C- CARCINOGENIC

Carcinogenic (CARC.)			
	Carc. 1 A	**Carc. 1 B**	**Carc. 2**
H350 May cause cancer	100 % > C ≥ 0,1%	100 % > C ≥ 0,1%	
H350i May cause cancer by inhalation	100 % > C ≥ 0,1%	100 % > C ≥ 0,1%	
H351 Suspected of causing cancer			100 % > C ≥ 1%
Signal Word	Danger	Danger	Warning

C -MUTAGENIC

Mutagenic (MUT)			
	Mut. 1 A	**Mut. 1 B**	**Mut. 2**
H340 May cause genetic defects	100 % > C ≥ 0,1%	100 % > C ≥ 0,1%	
H341 Suspected of causing genetic defects			100 % > C ≥ 1%
Signal Word	Danger	Danger	Warning

C – EXAMPLE

SAFETY DATA SHEET
according to Regulation (EC) No. 1907/2006

Version 6.9
Revision Date 11.03.2025
Print Date 12.08.2025
GENERIC EU MSDS - NO COUNTRY SPECIFIC DATA - NO OEL DATA

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

1.1 Product identifiers

Product name : Chloroform

Product Number : 319988
Brand : SIGALD
Index-No. : 602-006-00-4
REACH No. : 01-2119486657-20-XXXX
CAS-No. : 67-66-3

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

Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company : Merck Life Science ApS
Vandtårnsvej 62A,
DK-2860 SØBORG, DENMARK

Telephone : +45 43 56 59-20
Fax : +45 43 56 59-05
E-mail address : TechnicalService@merckgroup.com

1.4 Emergency telephone

Emergency Phone # : +(45)-6991 8573 (CHEMTREC)
+(45)-8212 1212 (Bispebjerg Hospital)
Ved akut udrykning og livsfare - 112

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Acute toxicity, (Category 4)	H302: Harmful if swallowed.
Acute toxicity, (Category 3)	H331: Toxic if inhaled.
Skin irritation, (Category 2)	H315: Causes skin irritation.
Eye irritation, (Category 2)	H319: Causes serious eye irritation.
Carcinogenicity, (Category 2)	H351: Suspected of causing cancer.
Reproductive toxicity, (Category	H361d: Suspected of damaging the unborn

Example:

Safety Data Sheet for Chloroform:

H351: Suspected of causing cancer.

§ 20 CLOSED FACILITY AND OTHER REQUIREMENTS

For many of the carcinogenic, mutagenic and reprotoxic chemicals listed in the "cancer" declaration Annex 1 and 2, it is stated **next to Laboratory use § 20**. This means that the work process may only take place in a **closed facility or in any other way that prevents the release of the substances or materials, so that any influence from this is excluded to the extent.**

A well-functioning fumehood, where inspections/measurements are carried out before use, checked annually by AU facility and have a certificate of trace gas measurement, can meet the above conditions.
Good laboratory practice for fumehoods, such as hatch opening, alarming, setting up equipment in relation to flow, cleaning, etc. must be followed.

Example: Chloroform, dichlormethan and formaldehyde.

There may be other requirements.

- ✓ § 5 Prohibition of use, the Danish Working Environment Authority may permit a deviation, requires an application.
  Example: Benzidin, 2-naphthylamin and 4-aminobiphenyl.

- ✓ § 17 may only be handled by an employee with a special section 17 education.
  Example : Work involving exposure to fumes from metal welding (welding fumes).

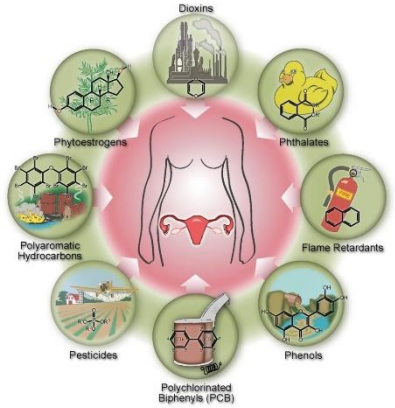
- ✓ §21 The work with the chemical must be effectively separated from other workplaces.
- ✓ § 32 must be stored behind a lock.
- ✓ § 30-34 containers must be marked according to CLP, waste must be marked with the yellow cancer mark.
- ✓ §45 Accidents – go to next slide.

- ✓ § 47-50 requires special approval from the Danish Working Environment Authority before work can begin.
  Example : Hexachlorbenzen, p-cresidin and 1,2-dimethylhydrazine.

R- REPRODUCTION TOXIC

Reproduction toxic (REPR.)				
	Repr. 1 A	**Repr. 1 B**	**Repr. 2**	**Lact.**
H360 F or D May damage fertility or the unborn child	100 % > C ≥ 0,3%	100 % > C ≥ 0,3%		
H361 f or d Suspected of damaging fertility or the unborn child			100 % > C ≥ 3%	
H362 May cause harm to breast-fed children				100 % > C ≥ 0,3%
Signal Word	Danger	Danger	Warning	-

R- ENDOCRINE DISRUPTERS



Endocrine disrupters (ED HH)		
	ED HH 1	**ED HH2**
EUH380 May cause endocrine disrution in humans	100 % > C ≥ 0,1%	
EUH381 Suspected of causing endocrine disrution in humans		100 % > C ≥ 1%
Signal Word	-	-

R – EXAMPLE

SAFETY DATA SHEET
according to Regulation (EC) No. 1907/2006

Version 6.16
Revision Date 02.01.2025
Print Date 12.08.2025
GENERIC EU MSDS - NO COUNTRY SPECIFIC DATA - NO OEL DATA

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

1.1 Product identifiers

Product name	:	Cadmium
Product Number	:	414891
Brand	:	Aldrich
Index-No.	:	048-002-00-0
REACH No.	:	A registration number is not available for this substance as the substance or its uses are exempted from registration or the annual tonnage does not require a registration.
CAS-No.	:	7440-43-9

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

Identified uses	:	Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company	:	Merck Life Science ApS Vandtårnsvej 62A, DK-2860 SØBORG, DENMARK
Telephone	:	+45 43 56 59-20
Fax	:	+45 43 56 59-05
E-mail address	:	TechnicalService@merckgroup.com

1.4 Emergency telephone

Emergency Phone #	:	+(45)-6991 8573 (CHEMTREC) +(45)-8212 1212 (Bispebjerg Hospital) Ved akut udrykning og livsfare - 112

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Acute toxicity, (Category 2)	H330: Fatal if inhaled.
Germ cell mutagenicity, (Category 2)	H341: Suspected of causing genetic defects.
Carcinogenicity, (Category 1B)	H350: May cause cancer.
Reproductive toxicity, (Category 2)	H361fd: Suspected of damaging fertility. Suspected of damaging the unborn child.

Example:

Safety Data Sheet for Cadmium:

H361fd: Suspected of damaging fertility and suspected of damaging the unborn child

A – ALLERGY/SENSITIZING

Sensitisers	H317 Skin sensitisers 	H334 Respiratory Sensitisers 	
Tabel 3.4.6	All physical states	Solid/Liquid	Gas
Category 1 Documentation	≥ 0,1%	≥ 0,1%	≥ 0,1%
Sub category 1A Frequent occurrence – high probability	≥ 0,01%	≥ 0,01%	≥ 0,01%
Sub category 1B Low incidence – low probability	≥ 0,1%	≥ 0,1%	≥ 0,1%

H317 May cause an allergic skin reaction
Causes allergic reaction on skin contact.

H334 May cause allergy or asthma symptoms or breathing
Induces hypersensitivity of the respiratory tract when inhaled.

A – EXAMPLE

Sigma-Aldrich.

www.sigmaaldrich.com

SAFETY DATA SHEET

according to Regulation (EC) No. 1907/2006

Version 7.7
Revision Date 24.06.2025
Print Date 12.08.2025
GENERIC EU MSDS - NO COUNTRY SPECIFIC DATA - NO OEL DATA

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

1.1 Product identifiers

Product name : Nickel(II) chloride

Product Number : 339350
Brand : Aldrich
Index-No. : 028-011-00-6
REACH No. : A registration number is not available for this substance as the substance or its uses are exempted from registration or the annual tonnage does not require a registration.
CAS-No. : 7718-54-9

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

Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company : Merck Life Science ApS
Vandtårnsvej 62A,
DK-2860 SØBORG, DENMARK

Telephone : +45 43 56 59-20
Fax : +45 43 56 59-05
E-mail address : TechnicalService@merckgroup.com

1.4 Emergency telephone number

Emergency Phone # : +(45)-6991 8573 (CHEMTREC)
+(45)-8212 1212 (Bispebjerg Hospital)
Ved akut udrykning og livsfare - 112

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Acute toxicity, (Category 3)	H301: Toxic if swallowed.
Acute toxicity, (Category 3)	H331: Toxic if inhaled.
Skin irritation, (Category 2)	H315: Causes skin irritation.
Respiratory sensitisation, (Category 1)	H334: May cause allergy or asthma symptoms or breathing difficulties if inhaled.

Example:

Safety Data Sheet for Nickel(II)chloride:

H317 May cause an allergic skin reaction.

H334 May cause allergy or asthma symptoms or breathing

N - NEUROTOXIC

Specific target organ toxicity is defined as specific, non-lethal target organ toxicity resulting from a single, prolonged or repeated exposure to a substance or mixture.
All significant health effects that may involve disability, both reversible and non-reversible, immediate and/or delayed are covered.
CRAN chemicals – damage to the central nervous system – CNS.

STOT-single	Category 1	Category 2	Category 3	Category 3
	H370 Causes damage to organs. State route of exposure and all organs affected, if known.	H371 May cause damage to organs. State route of exposure and all organs affected, if known.	H335 May cause respiratory irritation.	H336 May cause drowsiness or dizziness.
Pictogram				
	Danger	Warning	Warning	Warning

STOT-repeated	Category 1	Category 2
	H372 Causes damage to organs through prolonged or repeated exposure.	H373 May causes damage to organs through prolonged or repeated exposure.
Pictogram		
	Danger	Warning

N – EXAMPLE

Sigma-Aldrich.

www.sigmaaldrich.com

SAFETY DATA SHEET

according to Regulation (EC) No. 1907/2006

Version 8.0
Revision Date 05.03.2025
Print Date 12.08.2025
GENERIC EU MSDS - NO COUNTRY SPECIFIC DATA - NO OEL DATA

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

1.1 Product identifiers

Product name : 2-propanol, BioRenewable, anhydrous

Product Number : 937142
Brand : Sigma-Aldrich
Index-No. : 603-003-00-0
REACH No. : 01-2119457558-25-XXXX
CAS-No. : 67-63-0

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

Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company : Merck Life Science ApS
Vandtårnsvej 62A,
DK-2860 SØBORG, DENMARK

Telephone : +45 43 56 59-20
Fax : +45 43 56 59-05
E-mail address : TechnicalService@merckgroup.com

1.4 Emergency telephone

Emergency Phone # : +(45)-6991 8573 (CHEMTREC)
+(45)-8212 1212 (Bispebjerg Hospital)
Ved akut udrykning og livsfare - 112

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Flammable liquids, (Category 2)	H225: Highly flammable liquid and vapor.
Eye irritation, (Category 2)	H319: Causes serious eye irritation.
Specific target organ toxicity - single exposure, (Category 3), Central nervous system	H336: May cause drowsiness or dizziness.

Example:

Safet Data Sheet for 2-Propanol:

H336: May cause drowsiness or dizziness.

CRAN CHEMICALS AND H-STATEMENTS

H350 May cause cancer.

H350i May cause cancer by inhalation.

H351 Suspected of causing cancer.

H340 May cause genetic defects

H341 Suspected of causing genetic defects.

H360 May damage fertility or the unborn child.

H361 Suspected of damaging fertility or the unborn child.

H362 May cause harm to breast-fed children *(no hazard pictogram).*

EUH380 May cause endocrine disrution in humans (no hazard pictogram).

EUH381 Suspected of causing endocrine disrution in humans (no hazard pictogram).

H317 May cause an allergic skin reaction.

H334 May cause allergy or asthma symptoms or breathing.

H370 Causes damage to organs.

H371 May cause damage to organs.

H372 Causes damage to organs through prolonged or repeated exposure.

H373 May causes damage to organs through prolonged or repeated exposure.

H335 May cause respiratory irritation.

H336 May cause drowsiness or dizziness.

CRAN CHEMICALS

The working environment must ensure that employees are not exposed to hazardous chemical substances and that the necessary precautions are taken when such substances are used.

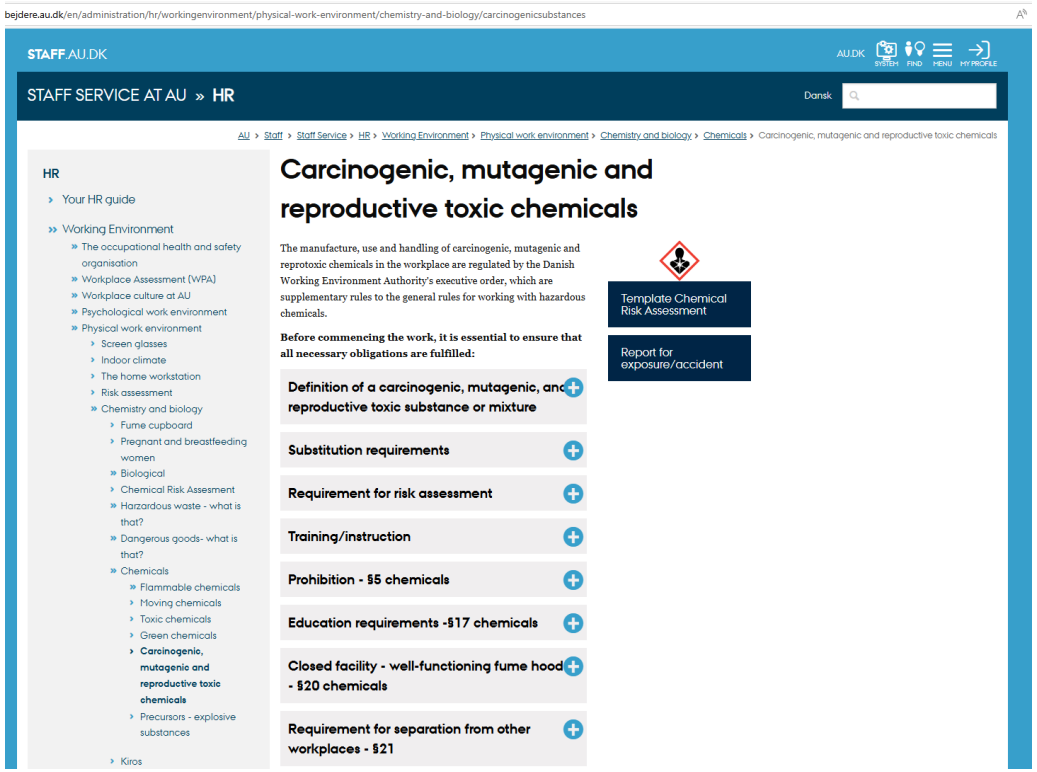
Substitution obligation:

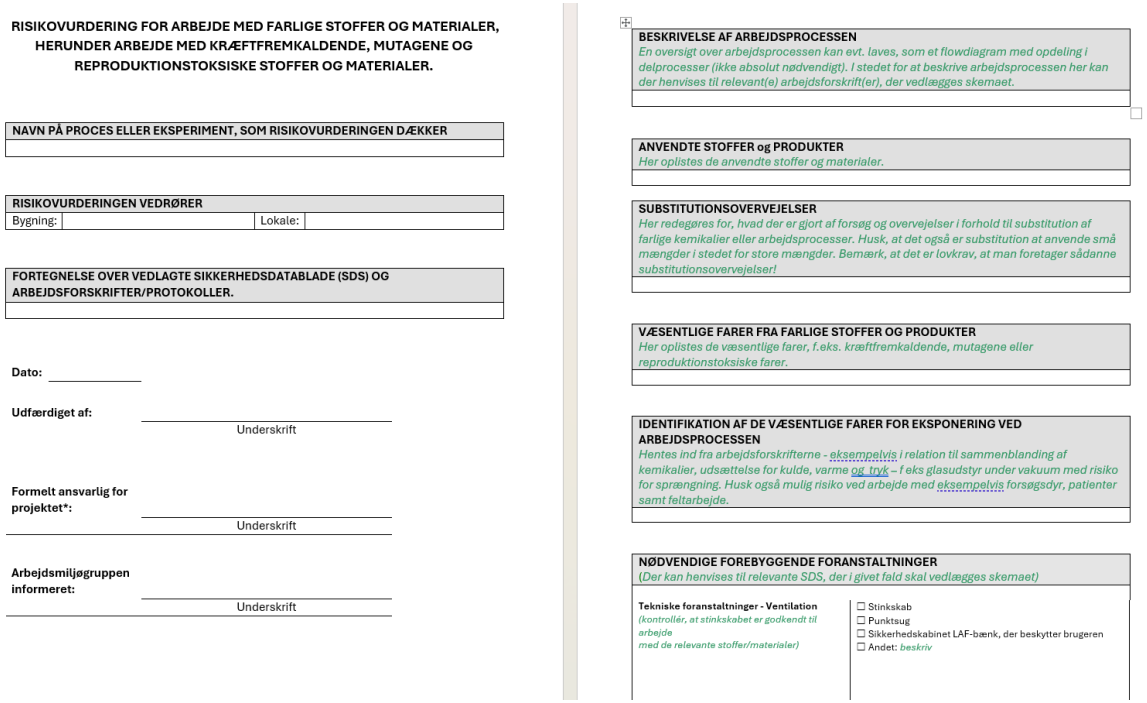
If possible, CRAN substances should be replaced by substances that are less hazardous.

Risk assessment:

Employers must carry out a written chemical risk assessment, that tell the user if there is a risk for exposure and which preventive measures must be taken before starting the work.

TEMPLATE FOR **CR**AN RISK ASSESMENT





RISIKOVURDERING FOR ARBEJDE MED FARLIGE STOFFER OG MATERIALER, HERUNDER ARBEJDE MED KRÆFTFREMKALDENDE, MUTAGENE OG REPRODUKTIONSTOKSISKE STOFFER OG MATERIALER.

NAVN PÅ PROCES ELLER EKSPERIMENT, SOM RISIKOVURDERINGEN DÆKKER

RISIKOVURDERINGEN VEDRØRER

Bygning: | Lokale:

FORTEGNELSE OVER VEDLAGTE SIKKERHEDSDATABLADE (SDS) OG ARBEJDSFORSKRIFTER/PROTOKOLLER.

Dato: _____

Udfærdiget af: _____ Underskrift

Formelt ansvarlig for projektet*: _____ Underskrift

Arbejdsmiljøgruppen informeret: _____ Underskrift

BESKRIVELSE AF ARBEJDSPROCESSEN
En oversigt over arbejdsprocessen kan evt. laves, som et flowdiagram med opdeling i delprocesser (ikke absolut nødvendigt). I stedet for at beskrive arbejdsprocessen her kan der henvises til relevant(e) arbejdsforskrift(er), der vedlægges skemaet.

ANVENDTE STOFFER og PRODUKTER
Her oplistes de anvendte stoffer og materialer.

SUBSTITUTIONSOVERVEJELSER
Her redegøres for, hvad der er gjort af forsøg og overvejelser i forhold til substitution af farlige kemikalier eller arbejdsprocesser. Husk, at det også er substitution at anvende små mængder i stedet for store mængder. Bemærk, at det er lovkrav, at man foretager sådanne substitutionsovervejelser!

VÆSENTLIGE FARER FRA FARLIGE STOFFER OG PRODUKTER
Her oplistes de væsentlige farer, f.eks. kræftfremkaldende, mutagene eller reproduktionstoksiske farer.

IDENTIFIKATION AF DE VÆSENTLIGE FARER FOR EKSPONERING VED ARBEJDSPROCESSEN
Hentes ind fra arbejdsforskrifterne - eksempelvis i relation til sammenblanding af kemikalier, udsættelse for kulde, varme og tryk – f eks glasudstyr under vakuum med risiko for sprængning. Husk også mulig risiko ved arbejde med eksempelvis forsøgsdyr, patienter samt feltarbejde.

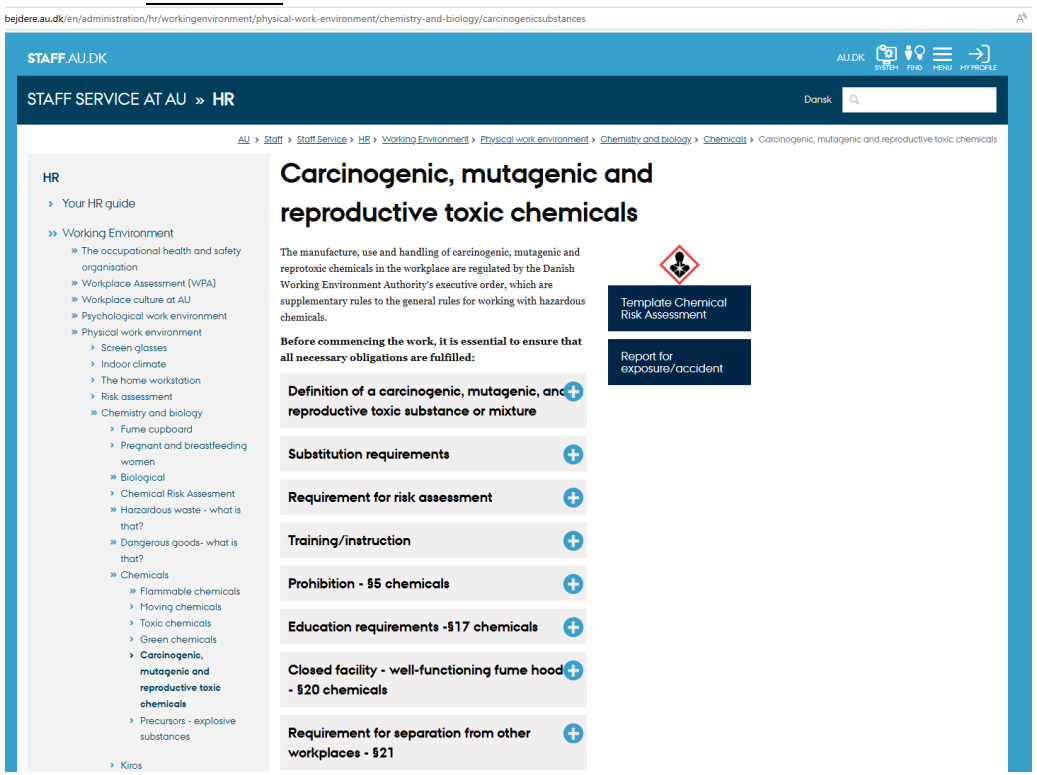
NØDVENDIGE FOREBYGGENDE FORANSTALTNINGER
(Der kan henvises til relevante SDS, der i givet fald skal vedlægges skemaet)

Tekniske foranstaltninger - Ventilation
(kontrollér, at stinkskabet er godkendt til arbejde med de relevante stoffer/materialer)

☐ Stinkskab
☐ Punktsug
☐ Sikkerhedskabinet LAF-bænk, der beskytter brugeren
☐ Andet: *beskriv*

https://medarbejdere.au.dk/en/administration/hr/workingenvironment/physical-work-environment/chemistry-and-biology/carcinogenicsubstances

§45 ACCIDENTS – EXPOSURE TO CARCINOGENIC, MUTAGENIC AND/OR REPRODUCTIVE TOXIC CHEMICALS.

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SKEMA 2 – EKSPONERING CRM

Registrering af personer der er blevet eksponeret i forbindelse med arbejde med kræftfremkaldende, mutagen eller reproduktionstoksiske stoffer og materialer.

Skemaet anvendes **KUN** i følgende tilfælde:

- Ved uheld/ulykker, hvor der er sket en eksponering.
- Hvor det på basis af risikovurderingen er konkluderet, at der er en reel risiko for eksponering.

Skemaet udfyldes af den ansatte, der arbejder med stoffet/produktet i samarbejde med den ansvarlige leder (forsker, vejleder eller kursusansvarlig).

Ansvaret for udfyldelse af skemaet ligger hos den ansvarlige leder.

NAVN PÅ PROCES ELLER EKSPERIMENT SOM RISIKOVURDERINGEN DÆKKER

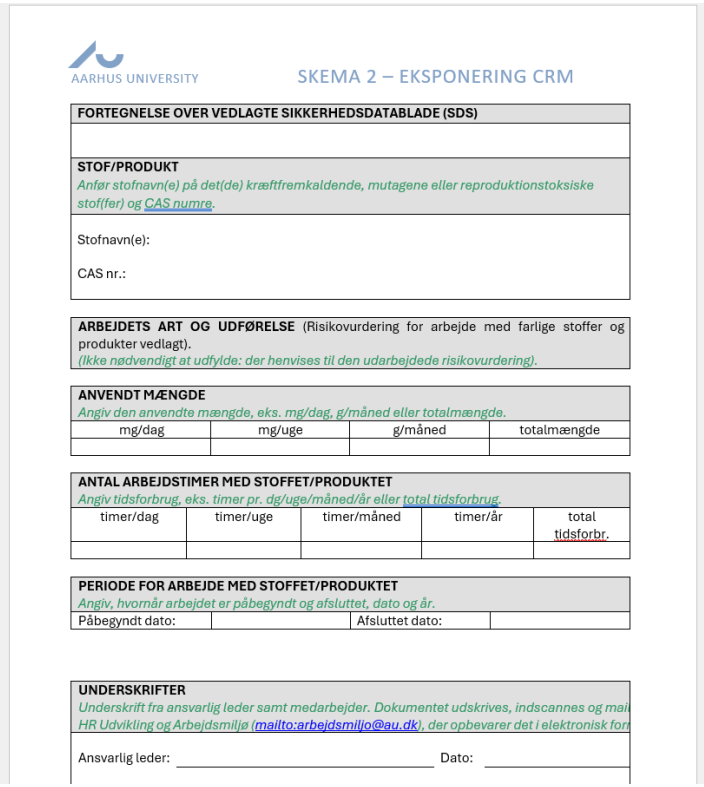
ARBEJDSSTED
Angiv bygning og lokalenummer, hvor stoffet/produktet anvendes. Hvis opbevaringsrummet er forskellig fra anvendelsesrummet, angives bygning og lokalenummer på opbevaringsrummet.

INSTITUT: BYGNING: LOKALE:

OPBEVARINGSSTED (Kun ændringer i forhold til ovenstående beskrives!)

INSTITUT: BYGNING: LOKALE:

ANSVARLIG LEDER OG MEDARBEJDER
Anfør navn m.v. på den person, der igangsætter brugen af stoffet/produktet (ansvarlig leder), samt navn og CPR-nummer på den medarbejder, der under den ansvarlige leders ansvar, arbejder med stoffet/materialet.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SKEMA 2 – EKSPONERING CRM

FORTEGNELSE OVER VEDLAGTE SIKKERHEDSDATABLADE (SDS)

STOF/PRODUKT
Anfør stofnavn(e) på det(de) kræftfremkaldende, mutagene eller reproduktionstoksiske stof(fer) og CAS numre.

Stofnavn(e):

CAS nr.:

ARBEJDETS ART OG UDFØRELSE (Risikovurdering for arbejde med farlige stoffer og produkter vedlagt).
(Ikke nødvendigt at udfylde: der henvises til den udarbejdede risikovurdering).

ANVENDT MÆNGDE
Angiv den anvendte mængde, eks. mg/dag, g/måned eller totalmængde.

mg/dag	mg/uge	g/måned	totalmængde

ANTAL ARBEJDSTIMER MED STOFFET/PRODUKTET
Angiv tidsforbrug, eks. timer pr. dg/uge/måned/år eller total tidsforbrug.

timer/dag	timer/uge	timer/måned	timer/år	total tidsforbr.

PERIODE FOR ARBEJDE MED STOFFET/PRODUKTET
Angiv, hvornår arbejdet er påbegyndt og afsluttet, dato og år.

Påbegyndt dato:		Afsluttet dato:	

UNDERSKRIFTER
Underskrift fra ansvarlig leder samt medarbejder. Dokumentet udskrives, indscannes og mail HR Udvikling og Arbejdsmiljø (mailto:arbejdsmiljo@au.dk), der opbevarer det i elektronisk for

Ansvarlig leder: _____ Dato: _____

§45 An accident form must be completed **if an exposure has occurred**. The form is sent to AU HR, via your local occupational health and safety organisation – **the form is stored for 40 years for carcinogenic chemicals and 5 years for reprotoxic chemicals.**

BCE EXAMPLES

BCE – EXAMPLE FOR SPENT CO-LTFT CATALYST

Label elements

South Africa. GHS Classification and Labelling of Chemicals - SANS 10234

Pictogram

Signal word Danger

Hazard statements
H317: May cause an allergic skin reaction.
H334: May cause allergy or asthma symptoms or breathing difficulties if inhaled.
H350i: May cause cancer by inhalation.
H413: May cause long lasting harmful effects to aquatic life.

SECTION 8. Exposure controls/personal protection

Components with workplace control parameters

NATIONAL OCCUPATIONAL EXPOSURE LIMITS

Contains no substances with occupational exposure limit values.

Exposure controls

Engineering measures

Provide sufficient air exchange and/or exhaust in work rooms.

Personal protective equipment

Respiratory protection	Effective dust mask
Hand protection	Impervious gloves
Eye protection	Safety glasses with side-shields
Skin and body protection	Protective suit Safety shoes
Hygiene measures	Wash hands thoroughly after handling.

Print Date 29.05.2019 100000008850 6/11

Contains 13-19% cobolt and 2-7% cobolt oxide, labbeled with:

H317: May cause an allergic skin reaction.
H334: May cause allergy or asthma symptoms or breathing
H350i: May cause cancer by inhalation.
H413: May cause long lasting harmful effects to aquatic life.

1. CRAN Chemical – Consider substitution.

2.Go through the work process and think in particular about exposure via inhalation and skin contact. What are the quantities and frequency?

3.Should it be handled as powder or liquid form? If powder, can dust form in the process? If liquid, can particles form that can be inhaled?
What are the quantities and frequency? Attention to waste collection is harmful to the aquatic environment.
Make sure to encapsulate the work task, as well as use personal protective equipment (ventilation, coat/work clothes, gloves and glasses) respiratory protection if no ventilation.

The safety data sheet is deficient in point 8, which states, for example: Effective dust mask, what is effective, dust filter 1,2 or 3? The same with the gloves?
It is important that you get back to the supplier and ask them to state it specifically in the safety data sheet.

BCE – EXAMPLE
DURASYN 164 POLYALPHAOLEIN

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Product definition : Substance

Classification according to Regulation (EC) No. 1272/2008 [CLP/GHS]
Asp. Tox. 1, H304

The product is classified as hazardous according to Regulation (EC) 1272/2008 as amended.
See Section 16 for the full text of the H statements declared above.
See Section 11 for more detailed information on health effects and symptoms.

2.2 Label elements

Hazard pictograms :

Signal word : Danger

Hazard statements : H304 - May be fatal if swallowed and enters airways.

Precautionary statements

General : P103 - Read label before use.
P102 - Keep out of reach of children.
P101 - If medical advice is needed, have product container or label at hand.

Prevention : Do not ingest.

Response : P301 + P310 + P331 - IF SWALLOWED: Immediately call a POISON CENTER or physician. Do NOT induce vomiting.

Storage : P405 - Store locked up.

Disposal : P501 - Dispose of contents and container in accordance with all local, regional, national and international regulations.

Hazardous ingredients : Dec-1-ene, trimers, hydrogenated

Supplemental label elements : Not applicable.

Labbeled with:

H304: May be fatal if swallowed and enters airways.

Not CRAN chemical – but still a hazardous chemical.

1.Consider substitution.

2.Go through the work process and think in particular about exposure via ingestion and inhalation of particles/aersolos. What are the quantities and frequency?

Should it be handled as powder or liquid form?

If liquid - should it be used in a way that can form particles, e.g. by pouring, or should it be sprayed so that aerosols can form?

Make sure to encapsulate the work task, as well as use personal protective equipment (fumehood, labcoat, gloves, glasses)

The safety data sheet is deficient in point 8, which states, for example: Use nitrile gloves, but it does not say the thickness of the nitrile glove, the same with respiratory protection – it must say something more specific.
However, this is in short supply for many safety data sheets, but it is important to get back to the supplier and ask them to state it specifically in the safety data sheet.

BCE – EKSEMPEL FOR REACTION WATER

No hazardous labelling?

Contians alcohols: 1,5% methanol, ethanol, n-propanol and n-butanol.

In section 15 a old hazard phrases is stated: R22 and R36/38- harmful if swallowed and irritation to skin and eyes.

A defective safety data sheet!

Ask the supplier for an updated safety data sheet that meets the requirements of the EU (REACH).

Material Safety Data Sheet

Section 1. Chemical Product and Company Identification

Common Name	**REACTION WATER**	**Code**	Not available.
Supplier	Sasol Technology P.O. Box 1 Sasolburg 9570 South Africa.	**MSDS#**	Not available.
		TSCA 8(b) inventory	TSCA 8(b) inventory: Water; Methanol; Ethanol ; n-Propanol; n-Butanol
Synonym	None	**Validation Date**	12/6/99
Trade name	None	**Print Date**	12/6/99
Material Uses	Not available.	**Responsible Name**	**lehlohonolo B Mothebe**
Manufacturer	Sasol Technology P.O. Box 1 Sasolburg 9570 South Africa.	**In Case of Emergency**	CALL: +27 16 960 2925 OR LOCAL: 0800 11 28 90 INTERNATIONAL: +27 17 610 4444

Section 2. Composition and Information on Ingredients

Name	CAS #	% by Weight	Exposure Limits
1) MAY CONTAIN TRACES OF LOWER ALCOHOLS:		1.5	
2) Methanol	67-56-1		TWA: 200 STEL: 250 CEIL: 200 (mg/m³) from ACGIH (TLV) [United States] TWA: 200 STEL: 250 from OSHA (PEL) [United States]
3) Ethanol	64-17-5		TWA: 1880 (mg/m³) from ACGIH (TLV) [United States] TWA: 1000 (ppm) from OSHA (PEL) [United States] TWA: 1900 (ppm) from OSHA (PEL) [United States] TWA: 1900 (mg/m³) from OSHA (PEL) [United States]
4) n-Propanol	71-23-8		TWA: 200 STEL: 250 (ppm) from ACGIH (TLV) [United States] [1996] Inhalation Respirable. TWA: 200 STEL: 250 from OSHA (PEL) [United States] [1994] Inhalation Respirable.
5) n-Butanol	71-36-3		CEIL: 152 (mg/m³) from ACGIH (TLV) [United States] SKIN TWA: 100 CEIL: 50 (ppm) from ACGIH (TLV) [United States] SKIN TWA: 300 CEIL: 152 (ppm) from OSHA (PEL) [United States] TWA: 300 (mg/m³) from OSHA (PEL) [United States]

Section 3. Hazards Identification

Physical State and Appearance	Liquid.
Emergency Overview	Keep away from heat, sparks and flame. Keep container closed. Use only with adequate ventilation. Avoid exposure during pregnancy.
Routes of Entry	Inhalation. Ingestion.
Potential Acute Health Effects	
Eyes	Slightly hazardous in case of eye contact (irritant).
Skin	Sensitization of the product: Not available. Slightly hazardous in case of skin contact (irritant). Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.
Inhalation	Slightly hazardous in case of inhalation.

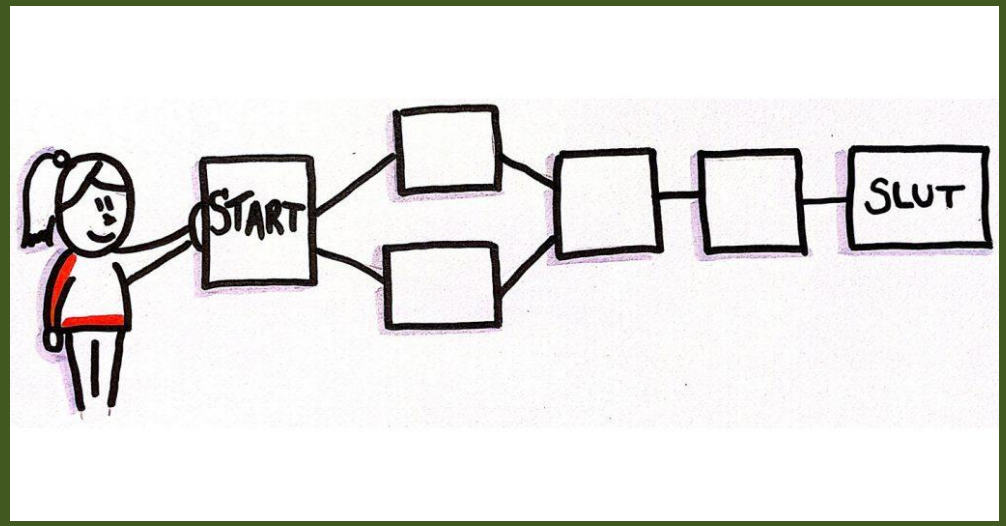
Continued on Next Page ***Validation Date:*** **12/6/99**

Section 8. Exposure Controls/Personal Protection

Engineering Controls	Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.
Personal Protection	
Eyes	Safety glasses.
Body	Lab coat.
Respiratory	Wear appropriate respirator when ventilation is inadequate.
Hands	Gloves, Butyl rubber.
Feet	Not applicable.
Protective Clothing (Pictograms)	
Personal Protection in Case of a Large Spill	Splash goggles. Full suit. Boots. Gloves. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Product Name	Exposure Limits
1) MAY CONTAIN TRACES OF LOWER	

ADVICES FOR CHEMICALS



CHEMICALS

Recieving

Is the chemical received hazardous?

Can the hazard label be read and understood?
CLP-marking.

Was a Safety Data Sheet (SDS) included or a link to it?
Is the chemical registered in Kiros?

KIROS

Is it a **CRAN** chemical?

CHEMICALS

Storage

Ulykke i Tianjin 2015

How should the chemical be stored, are there special conditions that must be taken into account?

- Toxic chemicals (H300, H301, H310, H311, H330, H331 and H370),
  Carcinogenic (H350),
  Mutagenic (H340),
  Reproductive toxic (H360) there is a requirement for storage under lock - Sikker opbevaring af gifte (mst.dk)

- **Flammable liquids** are limited by **storage units** - Brandfarlige og brændbare væsker (brs.dk)

- **Gasses** are limited by **storage units** - Microsoft Word - 101217_Vejledning om gasser.doc (bsik.dk)

- Corrosive chemicals must be stored below eye level.

- Chemicals that react dangerously with each other must not be stored together - Segregation.
  Example: Acids and bases - Opbevaring af laboratoriekemikalier - HK (yumpu.com)

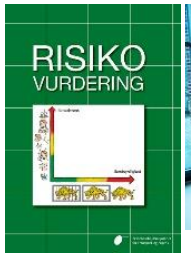
CHEMICALS

Handling

Is a **chemical risk assesment** prepared?

Which **preventive measures** should be used?

Which **personal protective equipments** should be used?



Is a **training/instruction** performed?

Are there any special rules that are taken into account before the work begins?

- Working with carcinogenic and mutagenic chemicals requires a risk assessment, which must first be approved by the local AMG.
  Foranstaltninger til forebyggelse af kræftrisikoen ved arbejde med stoffer og materialer - Arbejdstilsynet

- Working with flammable liquids > 10 litres and explosive chemicals requires an assessment of whether it is an ATEX zone or not. If there are ATEX zones, an ATEX risk assessment (WPA) must be prepared.
  Bekendtgørelse om elektrisk materiel og elektriske sikringssystemer til anvendelse i en potentielt eksplosiv atmosfære (retsinformation.dk)

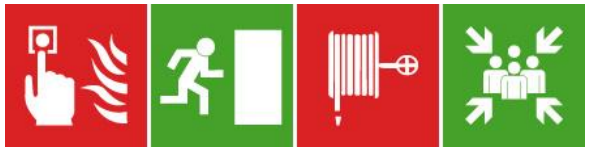
- Working with epoxy and isocyanates requires a statutory education - Arbejdstilsynet epoxy- og isocyanatholdige produkter

- There are restrictions for pregnant and breastfeeding women on which chemicals they can handle, a risk assessment must be carried out.
  Gravides og ammendes arbejdsmiljø - Arbejdstilsynet (at.dk)

- Working with pesticides may require special training -Professionel bruger (mst.dk)

CHEMICALS

Accidents



What should happen for each point where a risk of exposure has been identified in the event of an accident?
Should personal protective equipment be used?
Where is the fire extinguishing equipment, running water, emergency shower, eyewash etc.?
Should the area be closed off and building evacuated?

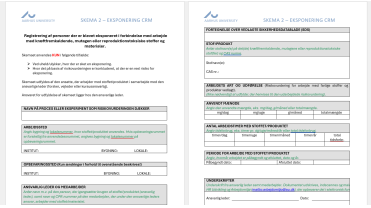
Example.:

A. If a chemical spill occurs in the fumehood, collect it with damp paper that is collected for the waste container, change gloves and possibly labcoat if there is a spill on this.

B. If there is a spill of chemicals outside the fumehood, evacuate the area, provide first aid to those in distress, e.g. during the emergency shower. Afterwards, clean with full equipment (labcoat/protective suit, gloves, respirator and goggles, depending on the chemical and the room is well ventilated before use.

C. In the event of a fire, alarms, extinguish the fire using fire extinguishing equipment while the building is being evacuated and the emergency response is on the way.

REMEMBER to fill out a special form if you are exposed to carcinogenic, mutagenic and reprotoxic chemicals that are stored via the local working environment group for 40 and 5 years, respectively.



CHEMICALS

Waste

Figur 7: Sorteringsnøgle. * Indeholder undergrupperne O_1, O_2, O_3 og O_4.
** Indeholder undergrupperne X, X og X. Se tekst for yderligere forklaring.

Instruction in the correct sorting and disposal of chemical waste, including waste group and waste fraction.

Instruction of other waste, including special labelling of waste.

Instruction in the correct disposal of protective equipment after use and other handling of waste, including specially marked waste.

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EXTRA

CHEMICAL WORK ENVIRONMENT

SUMMARY

CHEMICAL WORK ENVIRONMENT

SUMMARY

CHEMICAL WORK ENVIRONMENT - SUMMARY

1.Plan and organize the work in such a way that it can be carried out in a completely safe and healthy manner.

2.Get information about the chemical by reading the **safety data sheet**, information about which hazardous properties, handling, storage, types of personal protective equipment.

3. Check whether there are hazardous, including CRAN chemicals in the chemicals/products – this is stated on the label or in the safety data sheet- look for the pictograms and H-statements.

4. Try to replace the hazardous chemicals with less harmful chemicals (substitution). Call for less harmful alternatives from the supplier.

5.Check if the preventive measures are in order, e.g:

* Closed machinery, appliances, equipment,
* Well-functioning extraction/ventilation (fumehood point extractor, suction cupboards)
* Personal protective equipment (type of gloves, respirator, safety glasses, clothing)
* Personal hygiene
* Requirements for special handling and storage (poison cabinet, fire storage – rules for pregnant and breastfeeding woman).
* Requirements for special training (epoxy education).

§13. When carrying out the work, it must be ensured,

- 2. **that the danger of explosion, fire, poisoning and suffocation, etc. is effectively prevented,**
- 3. that **effective measures are taken to prevent spills, leakages and the development of dust, smoke, steam, odour, gas,** etc. where this can cause a danger óf safety or health..

CHEMICAL WORK ENVIRONMENT - SUMMARY

6. Conduct a chemical risk assessment.

Think through the entire work process, make a chemical risk assessment, focusing on the scenarios where an exposure can occur and highlight what measures are established to effectively remove the exposure. Exposure to hazardous substances and materials must be eliminated or limited in connection with the performance of the work by**:**

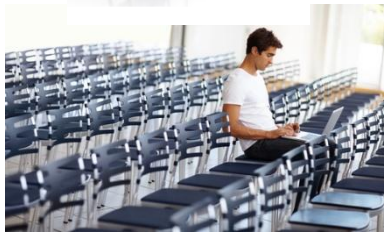
- the quantity of hazardous substances and materials **must be limited** to the minimum necessary for the work (substitution if necessary);
- through the **design** of the workplace (Encapsulating the work process),
- by the use of suitable **preventive measures**, e.g. process ventilation,
- by limiting to a **minimum the number of employees** affected or at risk of being affected by substances and materials;
- through appropriate working methods, including the **safe handling**, storage and transport of hazardous substances and materials;
- by appropriate measures with regard to **personal hygiene** and cleaning of surfaces,
- andby the use of suitable **personal protective** equipment.

If there is a work process that involves exposure to the employees, **measurements** must be made, especially when it is deemed necessary for compliance with the **limit values**, cf. the Executive Order on Limit Values for Substances and Materials.

The employer must **continuously check** whether the conditions are in order, including making the **necessary measurements to carry out the control**. Measurement results must be stored and presented to the Danish Working Environment Authority on request.

CHEMICAL WORK ENVIRONMENT - SUMMARY

7. **Make a written instruction** that can be used for training/instruction (SOP, guidance, poster, video, etc.)
Establish common principles for instruction on working with hazardous chemicals.

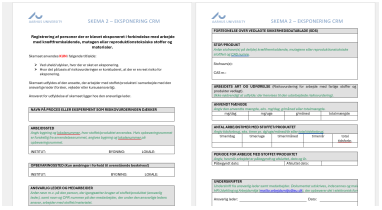


§11. If an employee **work alone** during a work process and this may cause a special danger to the employee, the work must be organised in such a way that this danger is counteracted. **If the danger cannot be countered, the employee must not work alone.**

Stk. 2. **It must be ensured that only employees who have received appropriate training have access to areas where there is a particular danger.**

8. Make a **procurement policy** for chemicals, e.g.:

* We want to avoid CRAN chemicals
* Establish procedures for examining new chemicals before they are purchased
* Establish procedures for safe shopping.



9. In the event of an accident and exposure – report it as a working environment injury and for carcinogenic, mutagenic and reprotoxic chemicals, a special form is required.

CHEMICAL RISK ASSESSMENT, TRAINING AND INSTRUCTIONS

List the hazardous chemicals

Label SDS

Chemical Risk Assessment:

Exposure

Hazards

Safety measures

Technical measures

Personal Protective Equipment

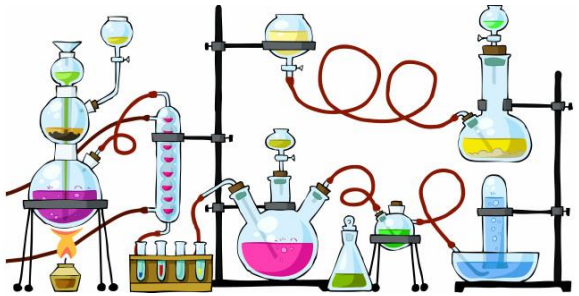
Disclosure of the result of the risk assessment:

Training/ Instruction

Inspections - Audits

Result = Desired behaviour ☺

SAFE WORK = GOOD RESULTS



- ✓Planning and prepartion (Prep)
- ✓Procedures/instructions
- ✓Facilities/Equipment
- ✓Skills/competences
- ✓Practice

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