

Chemicals and occupational health management /UN GHS System application

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Aim of the presentation

Knowledge about:

- **Effects of chemicals on humans**
- **Globally Harmonized System of Classification and Labelling of Chemicals (GHS)**
- **Classification, labelling and packaging of substances and mixtures (CLP Regulation)**
- **Chemical management**
- **Material Safety data sheet**
- **Measures against chemical exposure**

What are chemicals ?

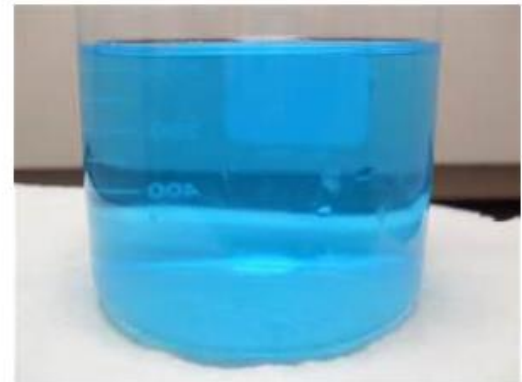
- **Chemical substances: elements and their chemical compounds with other elements, as they occur naturally or industrially produced**

Example : Dolomitt, $\text{CaMg}(\text{CO}_3)_2$ →



- **Mixtures: solutions or solid, liquid and gaseous mixtures of two or more chemical substances**

• Example : copper sulfate in water $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ →



Exposure routes to chemicals

Respiratory



Skin



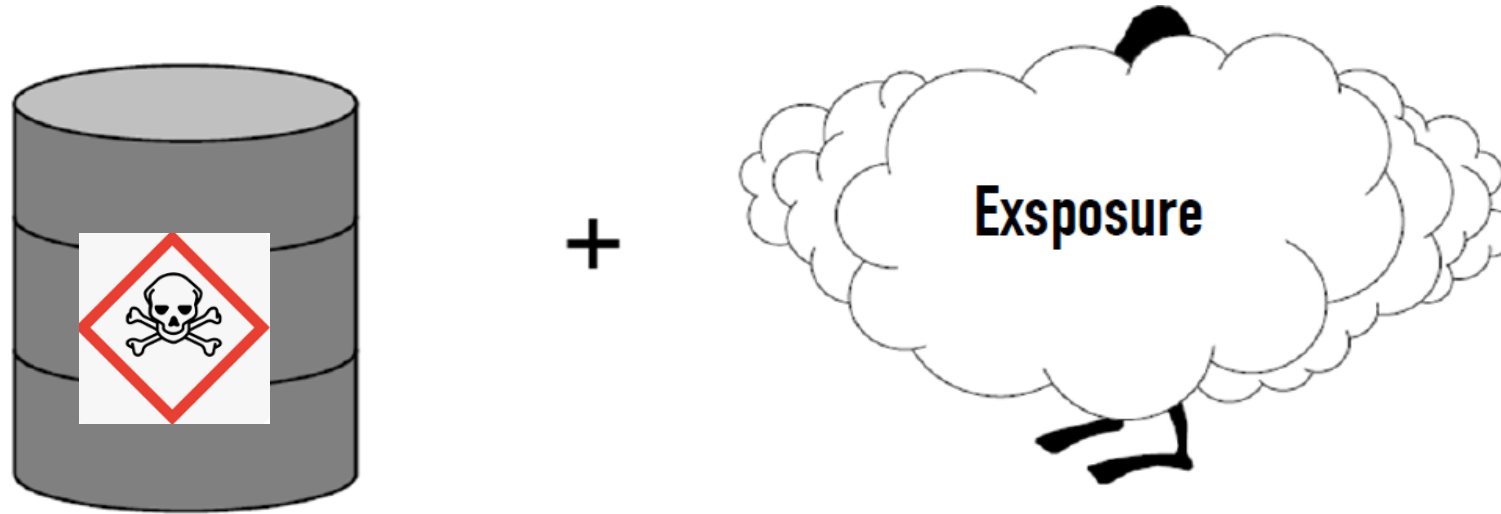
Eyes



Ingestion (indirectly via hands)



What are "hazardous chemicals"?

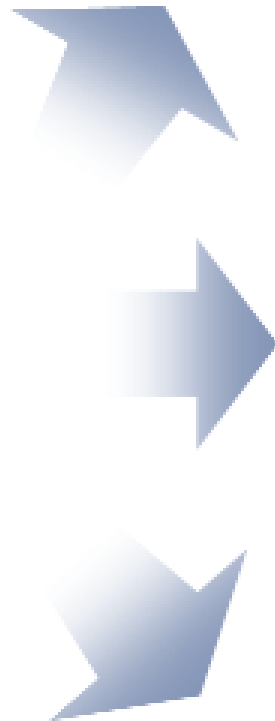


- **Chemicals that may pose a hazard to health, safety or the environment !!!**
- **Chemicals with hazard label**
- **Chemicals with the exposure limit or norm**

GHS

The **UN GHS Purple Book** is a guidance document published by the United Nations on the Globally Harmonized System of Classification and Labelling of Chemicals (**GHS**). The UN GHS Purple Book:

- Defines physical, health and environmental hazards of chemicals and harmonizes classification criteria;
- Standardizes the content and format of chemical labels and Safety Data Sheets.



Classification

Label

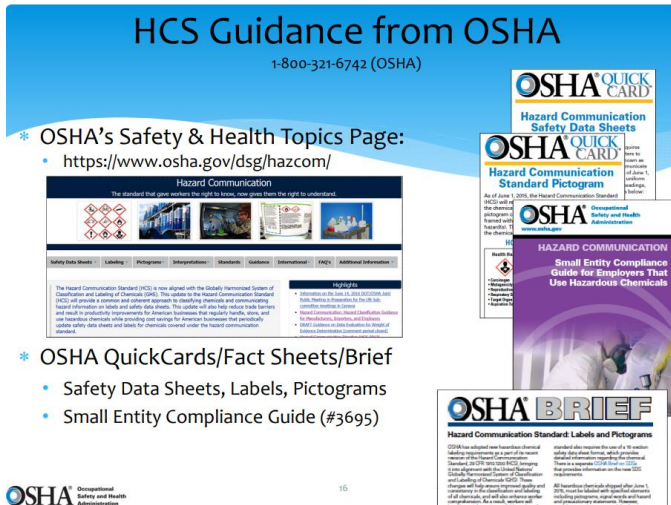
Safety Data Sheet

GHS

- As a voluntary international system, the GHS is not legally binding in any country.
- Therefore, countries adopting GHS have to issue their own regulations or standards to implement GHS criteria and provisions. Two examples are:
 1. Regulation (EC) No 1272/2008 on the classification, labelling and packaging of substances and mixtures (CLP Regulation)
 2. OSHA's Hazard Communication Standard 2012

HCS Guidance from OSHA
1-800-321-6742 (OSHA)

- * OSHA's Safety & Health Topics Page:
 - <https://www.osha.gov/dsg/hazcom/>
- * OSHA QuickCards/Fact Sheets/Brief
 - Safety Data Sheets, Labels, Pictograms
 - Small Entity Compliance Guide (#3695)



The image shows a collage of OSHA resources. At the top is a blue banner with the text 'HCS Guidance from OSHA' and the phone number '1-800-321-6742 (OSHA)'. Below this are two bullet points: 'OSHA's Safety & Health Topics Page: https://www.osha.gov/dsg/hazcom/' and 'OSHA QuickCards/Fact Sheets/Brief' with sub-points 'Safety Data Sheets, Labels, Pictograms' and 'Small Entity Compliance Guide (#3695)'. To the right, there are several overlapping images of OSHA materials: a 'QUICK CARD' for 'Hazard Communication Safety Data Sheets', a 'QUICK CARD' for 'Hazard Communication Standard Pictogram', a 'HAZARD COMMUNICATION Small Entity Compliance Guide for Employers That Use Hazardous Chemicals', and an 'OSHA BRIEF' titled 'Hazard Communication Standard: Labels and Pictograms'.



Scope of UN GHS and Applicable Industry Sectors

The GHS covers all hazardous chemicals, i.e., chemicals meeting the criteria for a [hazard class](#) in the GHS. Sectors that may adopt GHS include:

Transport	<ul style="list-style-type: none">• The UN Recommendations on the Transport of Dangerous Goods - Model Regulations takes precedence;• GHS parts expected to be adopted:<ul style="list-style-type: none">◦ GHS hazard classification criteria;◦ GHS hazard pictogram;
Workplace	<ul style="list-style-type: none">• Some authorities may not have jurisdictions over environmental hazards.• GHS parts expected to be adopted:<ul style="list-style-type: none">◦ GHS hazard classification criteria;◦ GHS label elements;◦ GHS safety data sheet;
Consumer	<ul style="list-style-type: none">• Labels may include the core elements of GHS labels subject to some sector-specific considerations(i.e., instructions for use, expiration date);• Risk-based labelling may be applied.• GHS parts expected to be adopted:<ul style="list-style-type: none">◦ GHS hazard classification criteria;◦ GHS label elements;
Pesticides	<ul style="list-style-type: none">• Pesticide labels may include the core elements of GHS labels subject to some sector-specific considerations(i.e., instruction for use, crops, expiration date);• GHS parts expected to be adopted:<ul style="list-style-type: none">◦ GHS hazard classification criteria;◦ GHS label elements;◦ GHS safety data sheets required in workplace.

Some countries have adopted GHS in all 4 sectors while other countries have only adopted GHS in 1 or 2 sectors. To check if your products require GHS labelling or Safety Data Sheets, you need to check whether your country has adopted GHS or not and which sector is applicable (if yes).










Pharmaceuticals, food additives, cosmetics and pesticide residues in food are **not covered** by the UN GHS (referring to chapter 1.1 of the UN GHS) at the point of consumption, but will be covered where workers may be exposed (workplaces), and in transport. Articles and foods are also usually out the scope of GHS.

GHS Hazard Class, Hazard Category and Hazard Pictogram

GHS describes the nature and severity of a chemical hazard by **hazard class and hazard category**. GHS also assigns standard pictograms representing different types of hazards.

- **Hazard class**: the nature of a chemical hazard, i.e., flammable liquids, carcinogen.
- **Hazard category**: the division of criteria within each hazard class. For example, flammable liquids have 4 categories among which flammable liquids category 1 represents the most severe hazard.
- **Hazard pictogram**: 9 pictograms conveying different types of health, physical and environmental hazards;

GHS PICTOGRAMS

<p>Health Hazard Carcinogens, respiratory sensitisers, reproductive toxicity, target organ toxicity, germ cell mutagens</p> 	<p>Flame Flammable gases, liquids, & solids; self-reactives; pyrophorics;</p> 	<p>Exclamation Mark Irritant, dermal sensitiser, acute toxicity (harmful)</p> 
<p>Gas Cylinder Compressed gases; liquefied gases; dissolved gases</p> 	<p>Corrosion Skin corrosion; serious eye damage</p> 	<p>Exploding Bomb Explosives, self-reactives, organic peroxides</p> 
<p>Flame Over Circle Oxidisers gases, liquids and solids</p> 	<p>Environment Aquatic toxicity</p> 	<p>Skull & Crossbones Acute toxicity (severe)</p> 

CLP regulation

The **CLP Regulation**^[1] (for "**C**lassification, **L**abelling and **P**ackaging"^[2]) is a European Union regulation from 2008, which aligns the European Union system of classification, labelling and packaging of chemical substances and mixtures to the Globally Harmonised System (GHS). It is expected to facilitate global trade and the harmonised communication of hazard information of chemicals and to promote regulatory efficiency. It complements the 2006 Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) Regulation (EC No 1907/2006)^[3] and replaces an older system contained in the Dangerous Substances Directive (67/548/EEC)^[4] and the Dangerous Preparations Directive (1999/45/EC).^[5]

The version of the CLP Regulation to which this guidance document currently refers is that based on the 7th revision of the UN GHS⁶. The CLP Regulation additionally takes on board some features and procedures from the previous EU system of classification and labelling, represented by Directive 67/548/EEC ("Dangerous Substances Directive" (DSD)) and Directive 1999/45/EC ("Dangerous Preparations Directive" (DPD)), that are not part of the UN GHS. Therefore, the CLP Regulation is similar to, but not identical to the way in which the UN GHS is introduced into the legal framework of countries outside the EU (note that differences may exist between implementation in individual non-EU countries).

CLP HAZARD SYMBOLS

ACUTE TOXICITY



Short-term exposure, such as inhalation or contact with skin, may be toxic or fatal.

HEALTH HAZARD OR HAZARDOUS TO THE OZONE LAYER



Exposure can result in irritation, drowsiness or dizziness, or cause less serious toxicity.

SERIOUS HEALTH HAZARD



Long-term exposure may cause serious and prolonged health effects.

OXIDISING



May cause or intensify a fire by increasing the concentration of oxygen in the air.

FLAMMABLE



The substance is flammable if exposed to an ignition source, spark, or heat.

EXPLOSIVE



The substance may explode or may explode if exposed to an ignition source.

CORROSIVE



Exposure can cause severe skin burns and eye damage. The substance may also be corrosive to metals.

GAS UNDER PRESSURE



The substance contains compressed, liquefied or dissolved gas. It may explode if heated.

HAZARDOUS TO THE ENVIRONMENT



The substance can have acute or long-term impacts on aquatic life.

CLP regulation

Application dates

The new rules are in force as of **20 April 2023**. From this day on, the Member States can make proposals for harmonised classification and labelling (CLH) with the new hazard classes and manufacturers, importers, downstream users and distributors can self-classify their substances and mixtures accordingly.

There are transitional periods from the entry into force of the Delegated Regulation, during which manufacturers, importers, downstream users and distributors are not yet required to classify their substances or mixtures according to the new hazard classes. During these periods, the new hazard classes can be applied on a voluntary basis.

At the end of the transitional periods, all manufacturers, importers, downstream users and distributors must apply the new hazard classes.



Chemical management

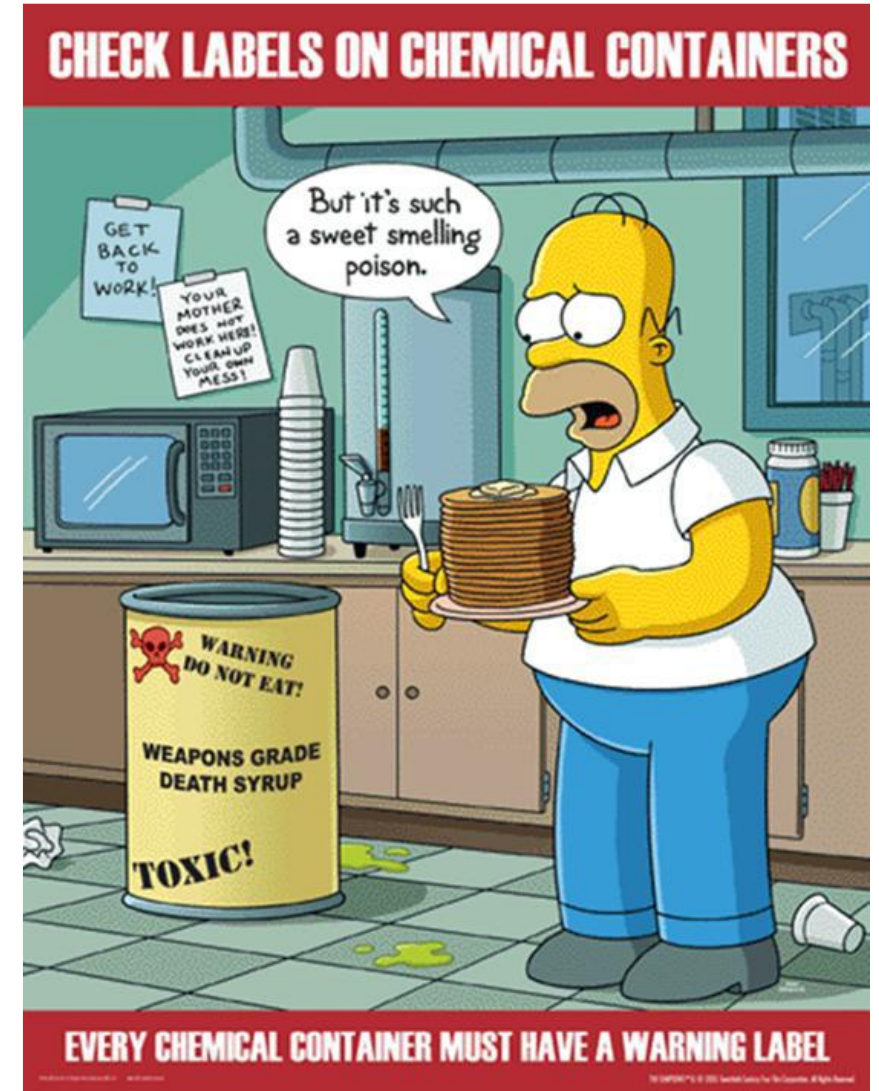
- Production
- Transportation
- Storage
- Use
- Disposal
- Chemical database
- Risk assessment
- Substitution



Chemical management

It is important that chemical substances are stored and separated according to their properties:

1. Explosives
2. Gases
3. Flammable Liquid and Combustible Liquid
4. Flammable Solid, and Dangerous When Wet
5. Oxidizer and Organic Peroxide
6. Poison (Toxic) and Poison Inhalation Hazard
7. Radioactive
8. Corrosive
9. Miscellaneous



No mixing of food packaging and chemicals!



<https://www.napofilm.net/no/napos-films/napo-danger-chemicals>

Material Safety data sheet

A **safety data sheet (SDS)**,^[1] **material safety data sheet (MSDS)**, or **product safety data sheet (PSDS)** is a document that lists information relating to **occupational safety and health** for the use of various **substances** and **products**. SDSs are a widely used system for cataloguing information on **chemicals**, **chemical compounds**, and **chemical mixtures**. SDS information may include instructions for the safe use and potential **hazards** associated with a particular **material** or product, along with spill-handling procedures. The older MSDS formats could vary from source to source within a country depending on national requirements; however, the newer SDS format is internationally standardized.

Has 16 points, the most important are:

- 1. Identification of the substance / mixture and of the company / undertaking**
- 2. Hazards identification**
- 3. Environmental**
- 4. First aid measures**
- 5. Firefighting measures**
- 6. Accidental Release Measures**
- 7. Handling and Storage**
- 8. Exposure controls / personal protection**

Material Safety data sheet

SAFETY DATA SHEET

Benzene

Airgas
an Air Liquide company

Section 1. Identification

GHS product identifier	: Benzene
Chemical name	: benzene
Other means of identification	: benzene, purebenzol; cyclohexatriene; phenyl hydride; phene; coal naphtha; pyrobenzol
Product type	: Liquid.
Product use	: Synthetic/Analytical chemistry.
Synonym	: benzene, purebenzol; cyclohexatriene; phenyl hydride; phene; coal naphtha; pyrobenzol
SDS #	: 001062
Supplier's details	: Airgas USA, LLC and its affiliates 259 North Radnor-Chester Road Suite 100 Radnor, PA 19087-5283 1-610-687-5253
24-hour telephone	: 1-866-734-3438

Section 2. Hazards identification

OSHA/HCS status	: This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).
Classification of the substance or mixture	: FLAMMABLE LIQUIDS - Category 2 SKIN IRRITATION - Category 2 EYE IRRITATION - Category 2A GERM CELL MUTAGENICITY - Category 1 CARCINOGENICITY - Category 1 SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) - Category 1

GHS label elements

Hazard pictograms	: 
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Signal word : Danger

Hazard statements : Highly flammable liquid and vapor.
Causes skin irritation.
Causes serious eye irritation.
May cause genetic defects.
May cause cancer.
Causes damage to organs through prolonged or repeated exposure.



Benzene
Safety Data Sheet
according to Regulation (EU) 2015/830
Issue date: 02/2017, Revision date: 4/12/2020, Version: 6.0

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

1.1. Product identifier	
Chemical type	: Substance
Trade name	: Benzene
EC Index-No.	: 601-020-00-8
EC-No.	: 200-753-7
CAS-No.	: 71-43-2
REACH registration No.	: 01-211947105-44
Product code	: MOL_0202_001_MOL_0202_023_MOL_0202_023_A_MOL_0202_025

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

1.2.1. Relevant identified uses	
Main use category	: Industrial use
Industrial/Professional use spec.	: Use as an intermediate

1.2.2. Uses advised against
No additional information available

1.3. Details of the supplier of the safety data sheet

Manufacturer: MOL Hungarian Oil and Gas Public Limited Company, Refining
Address: 2443 Széchenyváros, P.O.B. 1,
Telephone: +36-23-552-011,
Fax: +36-23-55-122
Distributor: MOL Hungarian Oil and Gas Public Limited Company
Address: 1117 Budapest, Október huszonegymásika utca 18.
Telephone, fax: +36-1-203-0000
The competent person responsible for Safety Data Sheet: sds@mol.hu

1.4. Emergency telephone number

Country	Organization/Company	Address	Emergency number	Comment
United Kingdom	National Poisons Information Service (Belfast Centre), Royal Victoria Hospital	Greenway Road, BT12 6BA Belfast	0344 852 0111	
United Kingdom	National Poisons Information Service (Birmingham Centre), City Hospital	Edgbaston Road, B15 2TH Birmingham	0344 852 0111	
United Kingdom	National Poisons Information Service (Cardiff Centre), St Marys Hospital	Penarth, CF23 3JL Cardiff	0344 852 0111	
United Kingdom	National Poisons Information Service (Edinburgh), Royal Infirmary of Edinburgh	Little France Crescent, EH16 5SB Edinburgh	0344 852 0111	
United Kingdom	Guy's & St Thomas' Poisons Unit, Medical Technology Unit, Guy's & St Thomas' Hospital Trust	Amber Road, SE11 8BN London	+44 20 7188 7188	
United Kingdom	National Poisons Information Service (Newcastle Centre), Regional Chem and Toxicology Centre, Walker Unit	Convent Place, Newcastle upon Tyne, NE1 6LP Newcastle	0344 852 0111	

SECTION 2: Hazards Identification

2.1. Classification of the substance or mixture

Classification according to Regulation (EC) No. 1272/2008 [CLP]

Flammable liquids, Category 2	H225
Skin corrosion/irritation, Category 2	H315
Serious eye damage/eye irritation, Category 2	H319
Gen. cell mutagenicity, Category 1B	H340
Carcinogenicity, Category 1A	H350
Specific target organ toxicity — Repeated exposure, Category 1	H372
Aspiration hazard, Category 1	H374

4/12/2020

6N (English)

18

Benzene Safety Data Sheet

according to Regulation (EU) 2015/830

Hazardous to the aquatic environment — Chronic Hazard, Category 3 H412

Full text of H statements: see section 16

2.3. Label elements

Labelling according to Regulation (EC) No. 1272/2008 [CLP]

Hazard pictograms (CLP)



Signal word (CLP)

: Danger

Hazard statements (CLP)

: H225 - Highly flammable liquid and vapour.
H304 - May be fatal if swallowed and enters airways.
H315 - Causes skin irritation.
H319 - Causes serious eye irritation.
H340 - May cause genetic defects.
H350 - May cause cancer.
H372 - Causes damage to organs (haematopoietic system) through prolonged or repeated exposure (oral, inhalation).
H412 - Harmful to aquatic life with long lasting effects.
P202 - Do not handle until all safety precautions have been read and understood.
P210 - Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P240 - Ground and bond container and receiving equipment.
P273 - Avoid release to the environment.
P280 - Wear protective gloves, protective clothing, eye protection, face shield.
P303+P361+P353 - IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water.
P331 - Do NOT induce vomiting.
P501 - Dispose of contents/container to hazardous or special waste collection point, in accordance with local, regional, national and/or international regulation.

Measures against chemical exposure

- **Elimination / substitution**
- **Technical measures**
- **Organisational measures**
- **Personal protective equipment (PPE)**



Elimination / substitution of hazardous chemicals

- Are chemicals required to perform the work operation?
- Try replacing the most serious chemicals through substitution if possible!

Technical measures

Can include but are not limited to:

- Good local exhaust ventilation, exhaust systems
- Good maintenance practices of ventilation systems
- Good lighting and climate

Personal protective equipment (PPE)

Can include but are not limited to:

- Proper selection and use of personal protective equipment
- Employees must wear respirators in operations that may lead to health risks
- Follow procedures for storage of respiratory protection, filter changes, OSV

Organisational measures

Can include but are not limited to:

- Training and awareness of all employees about the chemicals they work with
- Proper management of chemicals
- Inspections / safety inspections

Emergency Preparedness for unwanted chemical exposure can include

- **Emergency shower**

- **Rinsing eyes**

- **1.Help List caskets**

- **Firefighting Equipment**



PPE when working with chemicals

Can include but are not limited to:

- Clothing (aprons, chemical / work dress)
- Footwear (shoes, boots)
- Eye / face protection
- Respiratory protection (filter masks, breathing air)
- Gloves (chemical resistant gloves, work gloves, welding gloves)
- Hearing protection (earmuffs, ear plugs)

PPE when working with chemicals



Wear protective gloves (prevent eczema and rash, prevent the chemical penetrates the skin).



PPE when working with chemicals

Is there enough oxygen in the air (> 19.5%)?

Yes !

Filter mask

Against particles

P1- Used against not dangerous dust

P2 – Commonly used by dust work that is affecting health

P3 – Smoke and particularly hazardous dust

Against gas

A - Brown - Organic vapors and solvents

B - Inorganic and acidic gases, such as chlorine, halogens

E – Yellow- sulfur dioxide and hydrogen chloride

K - green – Ammonia

Hg- Red-Mercury

No !

Compressed mask

Combination filter (against particles + gas)

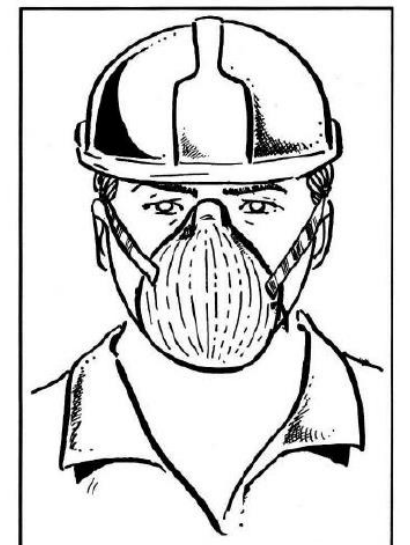
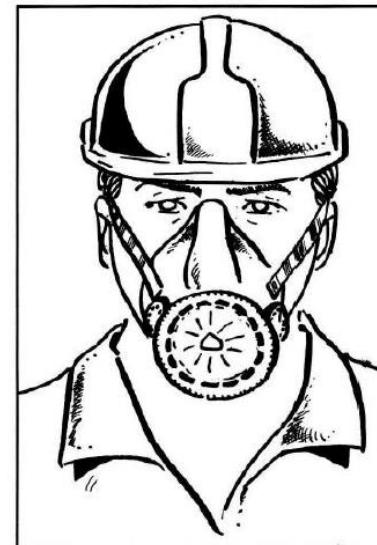


Masken skal
oppbevares i tett
boks



Respiratory protection

- Short Masks
- Half masks
- Full Face Masks
- Motorised respirator
- Respiratory protection for compressed air
- Portable, self-contained equipment (compressed air)



Is dependent on:

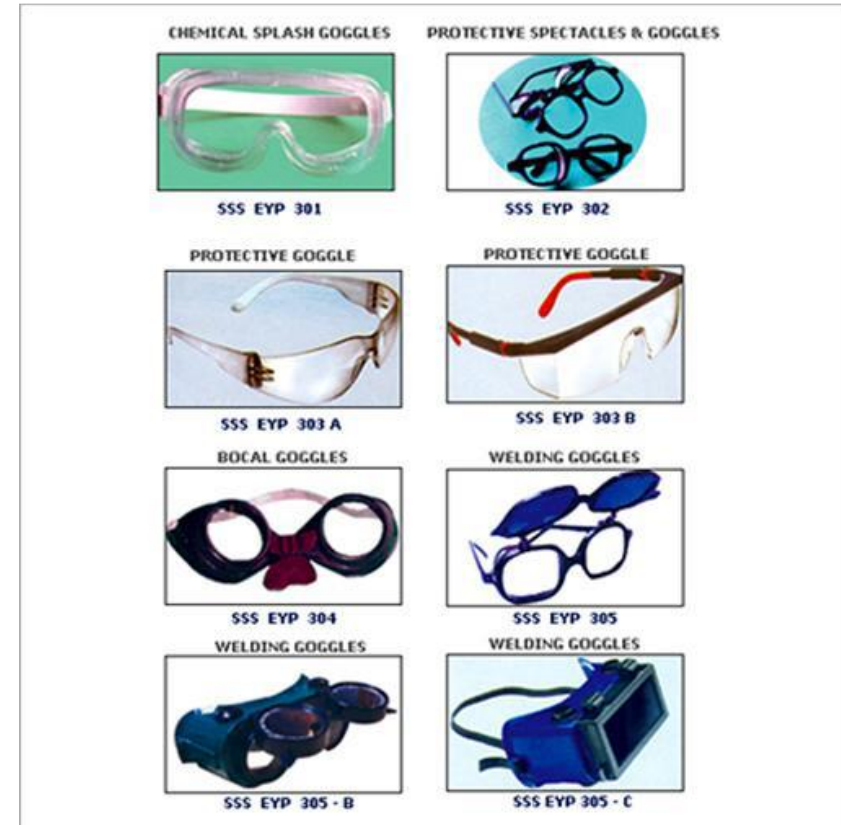
Respirator selection

- Concentration of oxygen
- Concentration of pollution
- Moisture
- Physical strain / stress
- Odorless chemicals
- Protection factor
- Compatible with other work equipment
- Explosion
- Beard, face shape, glasses, scars etc.
- Comfort
- Medical situation (lung capacity)



PPE when working with chemicals

- Goggles (protect your eyes)
- Face shield protects against splashes



PPE when working with chemicals

- Chemical Suits when working with very serious chemicals



Water jetting in manufacturing separator

PPE when working with chemicals

- Disposable dress: provides good protection against paint, chemicals, dirt and moisture



Responsibilities and duties

Employer responsibility

- Assessing risk at work
- PPE must be provided
- PPE must be CE marked
- Provide training in the use and maintenance
- Provide information on what PPE protects against
- PPE must be adapted to the employee and working conditions

Employee responsibility

- Follow instructions on the use of PPE
- Assessing risk at work to be performed
- Do not take risks

Remember!

- All equipment has its limitation
- Take into account the risks even when using protective equipment
- You must use your head and take care!



A hand is holding a white rectangular card against a light-colored wooden background. The card features the text "Thank you for listening" in a bold, black, sans-serif font, arranged in three lines. The text is surrounded by several small, red, heart-shaped stickers. There are 11 hearts in total: one above "Thank", one above "you", one to the right of "you", one to the left of "listening", one below "listening", one to the left of "listening", one to the right of "listening", one to the left of "listening", one to the right of "listening", one to the left of "listening", and one to the right of "listening".

**Thank
you for
listening**