



# Prevention of Exposure to Chemicals

## Day 2 – OSH Pro Services Conference Mombasa

*Mrs. Ida L. Scharff*

*Senior Inspector*

*The Danish Working Environment Authority*

# Prevention of Exposure to Chemicals

## Agenda

- Chemical Exposure
  - ✓ Exposure routes
  - ✓ Permanent and Temporaary
  - ✓ Systemic and direct effect, and sensitization
- Safety data sheets – An effective tool in prevention
- Labelling is very important
- Hierachy of control, the best way to avoid exposure

# Chemical Exposure

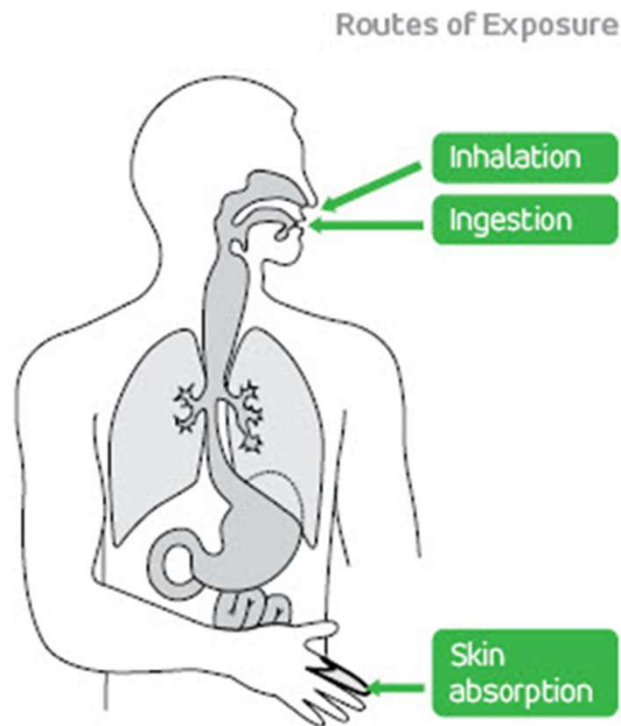
- Chemical exposure are an everyday occurrence for many workers in a wide variety of occupations, including:
  - Agriculture
  - Manufacturing
  - Tannery
  - Transportation
  - Construction
  - Services

# Chemical Exposure

- Chemical exposures can result in either **temporary** or **permanent** adverse health impacts.
- These health impacts may occur at the point of contact with the chemical, just after a single exposure (SE) or after repeated exposure (RE)

The chemical may enter the body by absorption through the skin/eyes, or by inhalation. Then the chemical can be distributed by the bloodstream, causing or contributing to a health problem somewhere else in the body.

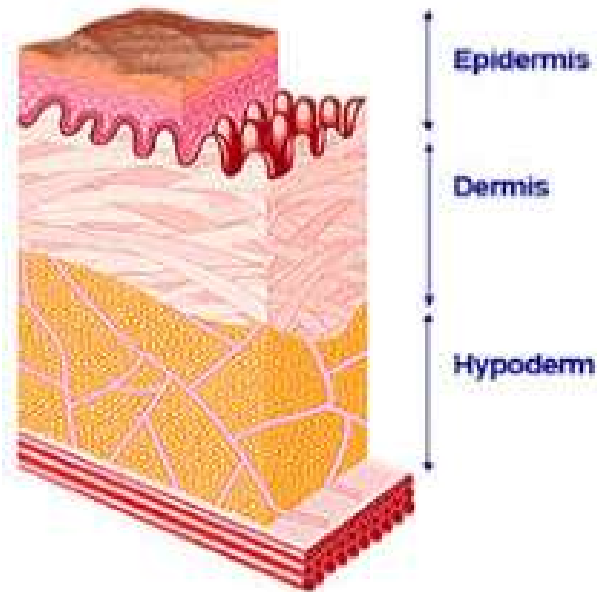
# Chemical Exposure - Routes



## Exposure Routes:

- Skin
  - irritation
  - absorption
- Inhalation
  - ingestion
- Eyes

# Chemical Exposure - Routes



**SKIN** is the body's protective cover and the principle site of interaction with the world around it. The skin limits the loss of water and other compounds from the body. At the same time, the skin also limits unwanted substances, including chemicals, from entering the body. Damage to the skin reduces its ability to protect the body.

# Chemical Exposure - Routes

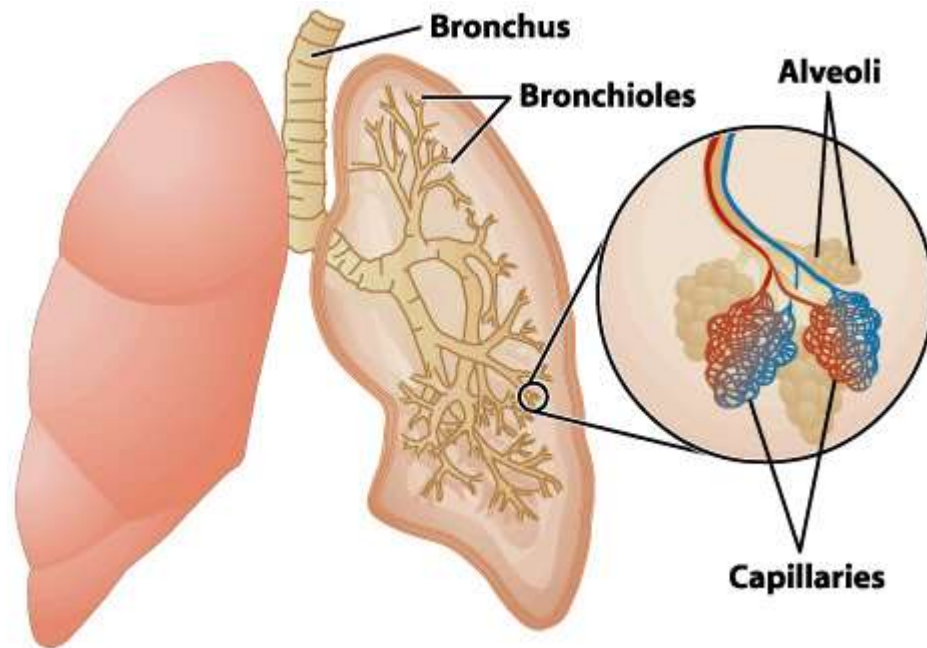
## **INHALATION (mouth/nose)**

The airways and lungs receive continuous first-pass exposure to non-toxic, irritant or toxic gases/dust via inhalation. Symptoms ranging from minor respiratory discomfort to acute airway and lung injury and even death.

## **EYES**

Chemical exposures and burns are usually caused by a splash of liquid getting in your eye. But they can be caused in other ways as well, such as by rubbing your eyes and transferring a chemical from your hands to your eyes or by getting sprayed in the eye by spray or other aerosols. Absorption through the eyes is possible.

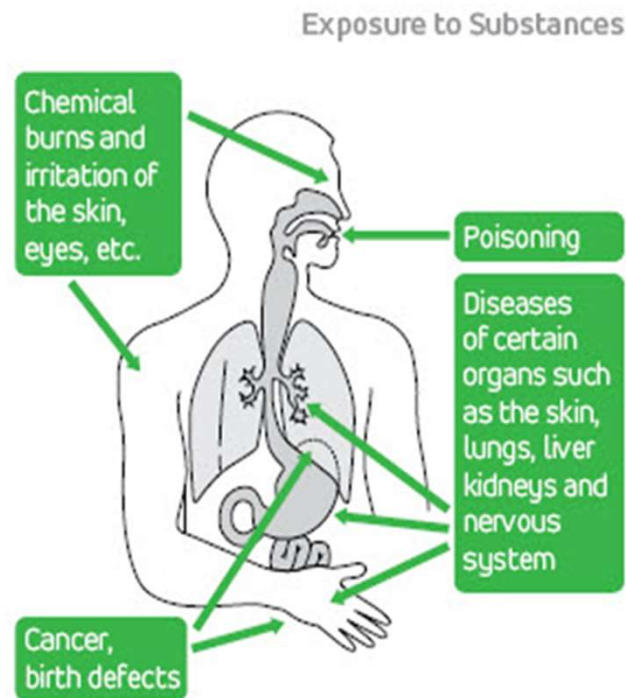
# Exposure - Temporary



- **Temporary** adverse health impacts may occur from exposure to chemicals.
- **Temporary skin** effects: dry eg. red or even cracked skin.
- **Temporary inhalation** effects: cough, chemical pneumonia

# Exposure – Permanent

- **Permanent** adverse health impacts may result if the exposure to a chemical that can cause severe damage. For example, a chemical burn of the skin may leave a permanent scar. Permanent damage after inhalation of dust, fumes or chemicals can occur, for example asbestosis, lung cancer, asthma or silicosis.



# Exposure - Systemic

- **Systemic - Away from Site of Entry**

A chemical may enter the body through intact or broken skin (absorption), inhalation/ingestion and cause or contribute to a health problem somewhere else in the body.

# Exposure – Systemic effects



- General health hazards associated with **solvent exposure** include toxicity to the nervous system, reproductive damage, liver and kidney damage, respiratory impairment, cancer, and dermatitis.



Pesticides/herbicides are chemicals that may impact body systems after absorption and inhalation.



# Exposure – Systemic effects

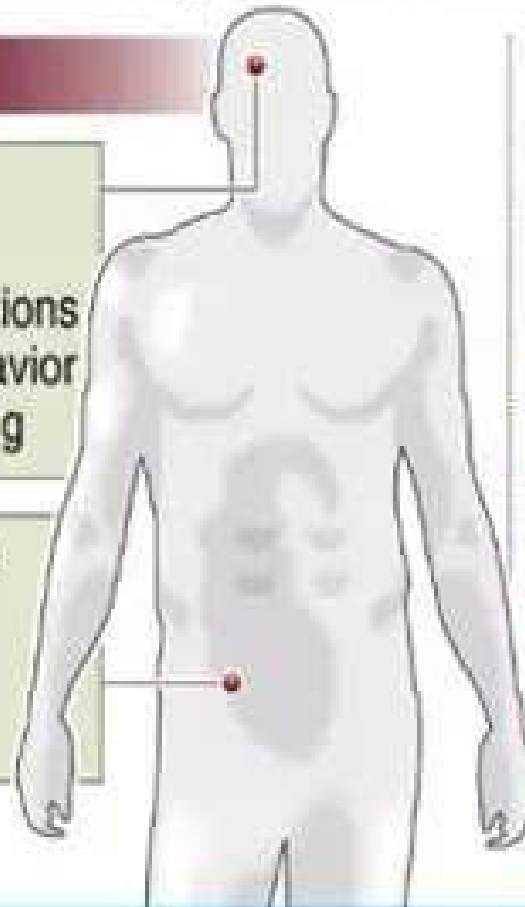
## Lead poisoning

Lead buildup in the body causes serious health problems

### Symptoms

- Headaches
- Irritability
- Reduced sensations
- Aggressive behavior
- Difficulty sleeping

- Abdominal pain
- Poor appetite
- Constipation
- Anemia



### Additional complications for children:

Lead is more harmful to children as it can affect developing nerves and brains

- ▶ Loss of developmental skills
- ▶ Behavior, attention problems
- ▶ Hearing loss
- ▶ Kidney damage
- ▶ Reduced IQ
- ▶ Slowed body growth

# Exposure – Direct effects

## Defatting/Dry skin

- Defatting or drying results is when a chemical removes the natural oils from the skin. The most frequent causes of defatted or dry skin are exposures to soaps, solvents, and moisture.

The effect is **minor severe skin burns**

This effect is temporary if the exposure ceases.

# Exposure - Sensitization

## Sensitization

- **Sensitization** is another type of health effect  
Chemicals may cause a sensitization effect, in which an individual becomes unusually susceptible to a chemical or group of chemicals.
- Sensitization effects include allergic contact **dermatitis and airway sensitization.**
- **Chemicals** that cause sensitization: Isocyanates, preservatives / *Isothiazolinoner* (MI, MIT, BI), organic dust, dyes etc.

# Exposure - Sensitization

- **Dermatitis Sensitization**

Allergic contact dermatitis is an allergic response (immunological response) of the skin as a result of exposure to a chemical.

Chemical exposures that may result in allergic contact dermatitis include epoxy resins, rubber chemicals, amine hardeners etc.



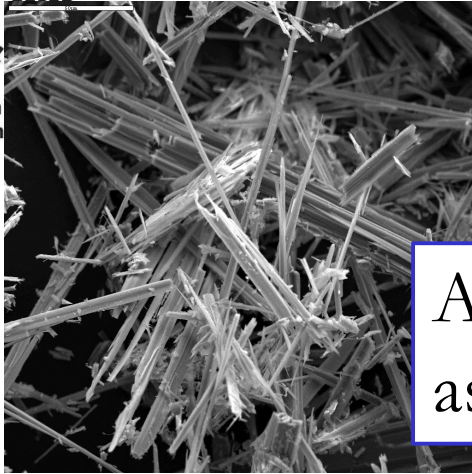
# Exposure – Combined effects

## Combined health effects

- Chemical exposure to the skin may cause multiple health effects. For example, individuals working with cement may experience combined adverse health effects. Contact with the cement may result in irritation at the point of contact from the alkaline nature of the cement. Workers may also become sensitized to cement due to the chrome salts present in the material.



# “DUST” an exempel



Asbestos  
asbestosis



Cotton dust  
byssinosis



Coal  
pneumoconiosis



Stone crushing  
silicosis

# Health Impacts - Summary

## Major Types of Adverse

- **Direct:** Exposure to chemicals can cause effects at the point of contact. These are called direct effects and include defatting/drying, irritation, corrosion, changes in pigmentation, chloracne, and skin cancer.
- **Systemic:** Chemicals can enter the body and cause or contribute to health problems somewhere else in the body. These are called systemic effects and may affect a specific organ or an entire body system.
- **Sensitization:** Chemicals may cause a sensitization effect, in which an individual becomes unusually susceptible to a chemical or group of chemicals. From then on, exposure to even very small amounts of the substance can cause an allergic reaction. The only way to deal with sensitization is to prevent any further exposure or contact with the chemical. Sensitization effects include allergic contact dermatitis and airway sensitization.
- **Combined:** Chemical exposure to the skin may cause multiple health effects in an exposed individual.

# Material Safety Data Sheet (MSDS)

A safety data sheet (SDS), material safety data sheet (MSDS), or product safety data sheet (PSDS) is an important component of occupational safety and health procedures and **RISK** assessment. SDS formats can vary from source to source within a country depending on national requirements.



# Material Safety Data Sheets

## Why ?

- In Material Safety Data Sheets (MSDS) you will find a lot of information about;
  - Handling,
  - Storageging
  - Personal protection equipment
  - Environmental.....etc.....etc.....
- A MSDS for a substance is not (primarily) intended for use by the general consumer, instead it is focusing on the hazards of working with the material in an occupational setting (workplaces).
- **Effective tool for safe use and handling**

# What does it look like?










- European Union decided in 2007 to use a format with 16 sections.
- In 2012, the US adopted the 16 section Safety Data Sheet to replace Material Safety Data Sheets. This became effective on December 1, 2013. These new Safety Data Sheets comply with the Globally Harmonized System of Classification and Labelling (GHS)
- What about Kenya – is there any legislation ?

# Labelling of containers

The label will tell us how hazardous the chemical is.



# Globally Harmonized System of Classification and Labelling of Chemicals

	<i>Exploding bomb</i> <b>Explosives</b>		<i>Flame</i> <b>Flammables</b>		<i>Flame over circle</i> <b>Oxidisers</b>
	<i>Gas cylinder</i> <b>Gases under pressure</b>		<i>Corrosion</i> <b>Corrosives</b>		<i>Skull and crossbones</i> <b>Acute toxicity</b>
	<i>Environment</i> <b>Environmental hazard</b>		<i>Exclamation mark</i> <b>Harmful/irritant</b> <b>Harmful to ozone layer</b>		<i>Health hazard</i> <b>Severe health hazards</b>

What does the symbols mean ?

# Globally Harmonized System of Classification and Labelling of Chemicals

## Hazards and Precautions

### H statements

- H2xx Physical hazards
- H3xx Health hazards
- H4xx Environmental hazards
- H31x Skin and eye contact
- H33x Inhalation
- H34x Genetic defects
- H35x Carcinogenic
- H36x Reproduction

### P statements

- P260: Do not breathe  
dust/fumes/gas/mist/vapors/spray.
- P262: Do not get in eyes, on skin, or  
on clothing.
- P302+352: IF ON SKIN: Wash  
with plenty of water

# Labelling of containers

To avoid accidents it is important to put labels on chemical containers. The label should at least contain:

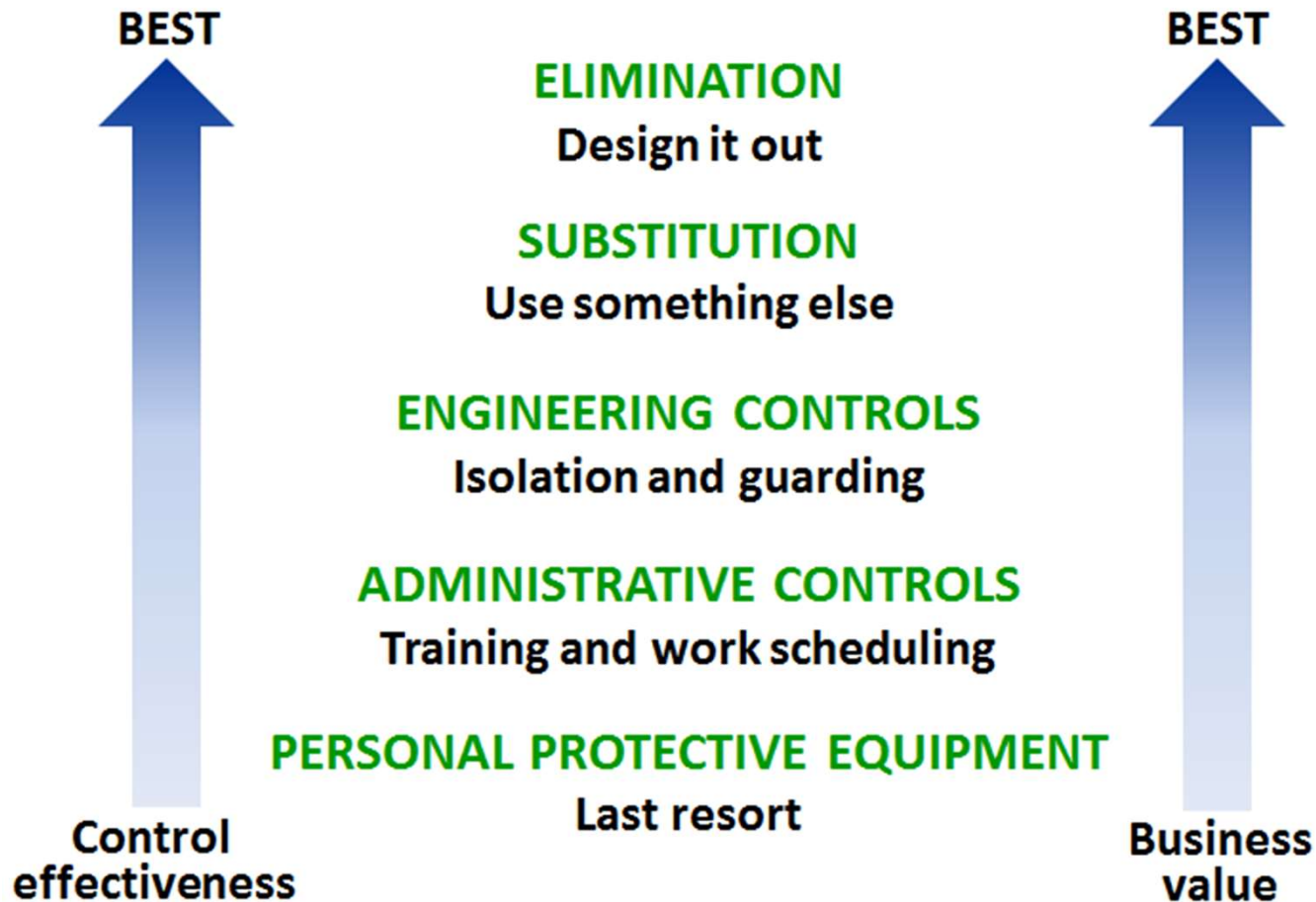
1. Name of chemical
2. Hazards (pictograms)
3. Main safe instructions





Danish Working  
Environment Authority

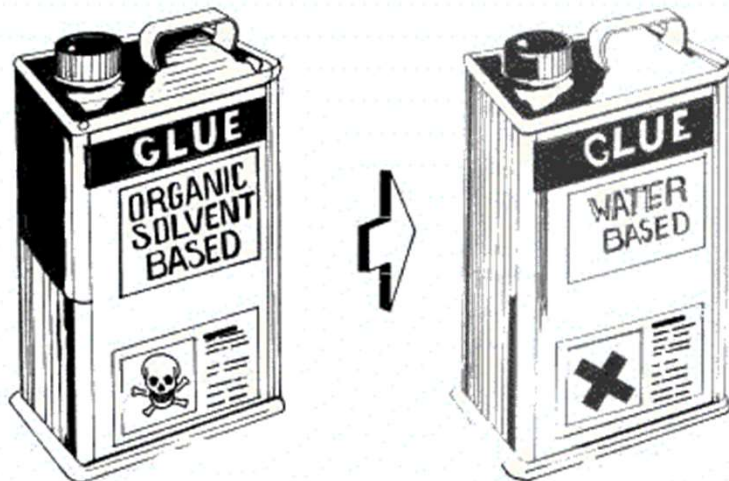
# Hierarchy of control





Danish Working Environment Authority

# Hierarchy of control



# Hierarchy of control





**Thank You**