Advices for using this Powerpoint

- Target audience: employer and EHS specialist
- Advices:
  1. Page 2-30 provide general information when using chemicals at work.
  2. Page 31-33 are templates. Specific exposure scenarios and cases for each industry or method can be added in this part. And, the powerpoint is allowed to be edited by users to meet their needs.

SAHTECH

Communicarion of Hazardous Chemicals in Workplace

2021 Training materials

SAHTECH

Outlines

1. Occupational injuries when using chemicals
2. Common operating methods may expose to chemicals
   - Electroplating process
   - Spray painting
   - Surface cleaning using organic solvents
   - (Suppliers) packaging materials
   - Wastewater treatment or substances in confined spaces
3. Labels of chemicals
4. Pictograms of GHS
5. Obligations of employers to protect labors' health and safety

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1. Occupational injuries when using chemicals

Improper use of chemicals can cause occupational hazards!

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Occupational injuries — explosions

- Acrylic resin polymerization reaction
  - While feeding materials, diphenylmethyl peroxide decomposed and exploded
  - Causes the workers to die or be injured on the spot

(Severe occupational injuries, 2015)

Occupational injuries — poison

- Waterproofing in underground pools
  - Due to inhalation of high concentrations of toluene and xylene gases,
  - Caused the workers to be poisoned and injured.

(Severe occupational injuries, 2017)

Occupational injuries—inhalation injuries

- Chemical leakage from a mixed acid tank
- Workers wore PPE for emergency response
  - The worker was hospitalized for lung injury due to inhalation of gunpowder smoke during the process.

(Severe occupational injuries, 2017)

2. Common operating methods may expose to chemicals

Which types of operation may danger to yourself ?

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Electroplating process

- Possible hazards:
  - Acid/base solution corrodes the skin or eyes
  - Inhalation of hexavalent chromium droplets
  - Carcinogen exposure
  - Cyanide exposure
  - Explosion caused by cyanide reaction when cleaning the tank

Spray painting

- Possible hazards:
  - Inhalation or skin contact with volatilized carcinogenic organic solvents (toluene, xylene, formaldehyde, etc.)
  - Inhalation of heavy metals in dust (powder coating)

Surface cleaning using organic solvents

- Possible hazards:
  - Volatilized organic solvents (acetone, 1-bromopropane, etc.)
  - Inhalation or skin contact with harmful chemicals

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(Suppliers) packaging materials

- Possible hazrads:
  - Inhalation or skin contact with harmful chemicals and organic solvents

Wastewater treatment or substances in confined spaces

- Possible hazards:
  - Inhalation or skin contact with harmful chemicals and organic solvents
  - There is hydrogen sulfide or oxygen deficiency inside the facility

3. Labels of chemicals

Ways to protect yourself

Toluene

DANGER

Substances: toluene

Hazard statements:
May be fatal if swallowed and enters airways
Highly flammable liquid and vapor
Harmful if swallowed
Causes serious eye irritation
Causes skin irritation
Suspected of damaging fertility or the unborn child
May cause damage to organs through prolonged or repeated exposure
Harmful to aquatic life with long lasting effects

Preventions:
Store in a well-ventilated place.
Keep away from heat/sparks/open flames. No smoking.
Avoid contact with eyes
Wear protective clothing

Information of manufacturers, importers or suppliers:
(1) Name:
(2) Address:
(3) Phone number:

See SDS for further details

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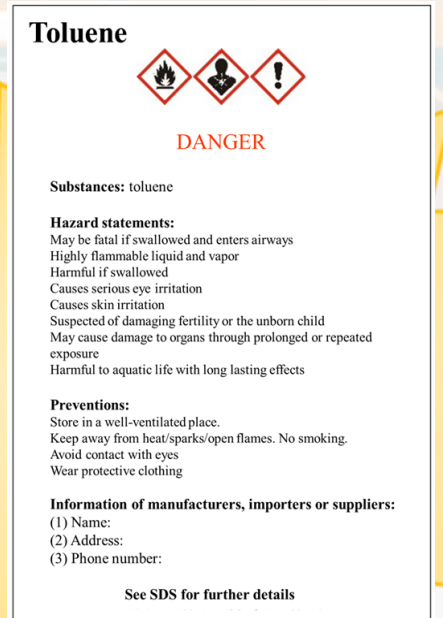
- What should I pay attention to?
- How can I protect myself?
- How can I prevent accidents?

It can be answered by the **label** on the chemical container



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- **What should I pay attention to?**

- Pictograms
- Chemical names
- Hazardous substances
- Signal words
- Hazard statements

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- How can I protect myself?
- Which PPE sould I wear?
- What protective measures should be taken?

According to Precautionary statements, …

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- **How can I prevent accidents?**

1. Confirm with the EHS specialist or the site supervisor.
2. If you are unclear, you should contact with the manufacturer or supplier.

Pictograms of GHS

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廢液桶放置處
有機溶劑(非鹵素)
廢液桶
DANGER
有機溶劑(非鹵素)
廢液桶

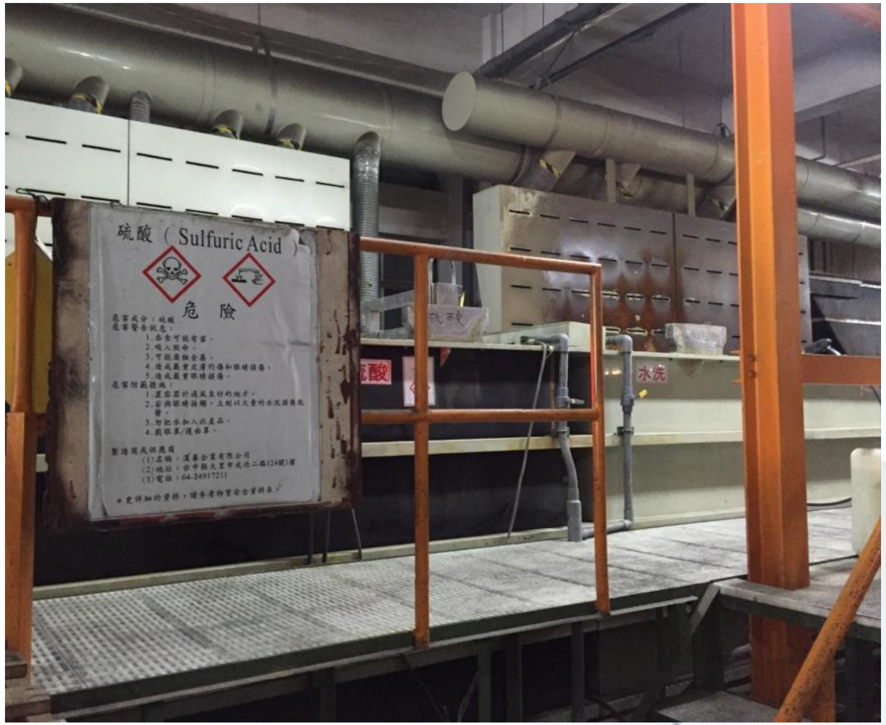

甲苯（Toluene）


14BG
1,4-丁二醇(1,4-Butylene glycol)
警告
火


正丁醇 (N-Butanol)
異丙醇 (Isopropyl Alcohol)
危險
二甲苯 (Xylene)
危險
室內儲存場所B區
公共危險物品
嚴禁煙火
異丁醇 (Isobuty Alcohol)
危險
甲苯 (Toluene)
危險


EAC : 3 E
警示語：危險
UN.NO : 1268 產品編號: 116S 02225


Gulf
GULFCUT
51-4
200L
DANGER
Gulf
GULFCUT
51-4
200L


硫酸（Sulfuric Acid）
危險
水洗


SDS
安全資料表

Pictograms related to fire and explosion

Flammable substances

- Heating may cause a fire
- Catches fire spontaneously if exposed to air
- Self-heating; may catch fire

Oxidizer

- May cause or intensify fire

Exploser

- Heating may cause a fire or explosion

Gas cylinder

- Contains gas under pressure; may explode if heated

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Pictograms related to fire and explosion

	 Flammable substance	 Oxidizer	 Exploser	 Gas cylinder
Chemicals	**Methane (CAS no.74-82-8)**	**Nitric acid (CAS no.7697-37-2)**	**Nitroglycerin (CAS no.55-63-0)**	**Nitrogen (CAS no.7727-37-9)**
Applied scenarios	Exist in sewage pipelines and sewers	Electroplating, preparation of nitrogen fertilizers	Preparation of nitrocellulose	Metal refining, liquid nitrogen
Protective equipment or measures	• Keep away from heat/sparks/open flames. No smoking. • Keep away from combustible materials. • Store in a well-ventilated place. • Wear PPE • Take measures against static discharge.		• Do not subject to grinding/ shock/friction.	• Store in a well-ventilated place.

Pictograms related to health

Acute toxicity

- Fatal/toxic if swallowed
- Fatal/toxic if inhaled
- Fatal/toxic in contact with skin

Corrosion

- Causes severe skin burns and eye damage
- May be corrosive to metals

Health hazard

- May cause cancer
- May cause genetic defects
- May damage fertility or the unborn child
- Causes damage to organs through prolonged or repeated exposure

Exclamation mark

- May cause respiratory irritation
- May cause drowsiness or dizziness

Pictograms related to health

Acute toxicity

Corrosion

Health hazard

Exclamation mark

Chemicals	**Hydrofluoric acid** (CAS no.7664-39-3)	**Sulfuric acid** (CAS no.7664-93-9)	**Benzene** (CAS no. 71-43-2)	**Ethanol** (CAS no.64-17-5)
Applied scenarios	Decontamination, etching, pickling	As electrolyte or catalyst	Synthesis benzene derivatives, as solvent	Sterilization, as fuel, solvent
Protective equipment or measures	• Store in a well-ventilated place. • Wear protective gloves/protective clothing/eye protection.			
	• Avoid contact with/inhalation/ ingestion of chemicals	• If in eyes: rinse cautiously with water	• Put it in a locked place • Familiar with all safety precautions	

Pictogram related to the environment

- (acute) Very toxic to aquatic life
- (chronic) Very toxic to aquatic life with long lasting effects
- Harm public health and the environment by destroying ozone in the upper atmosphere

- Protective equipment or measures:
  - Avoid release to the environment.

Example. 1-bromopropane

- Hazards:
  - May damage fertility or the unborn child
  - May cause cancer (IARC 2B, possibly carcinogenic to humans)
  - Highly flammable liquid and vapour
  - Causes damage to organs through prolonged or repeated exposure
- Applied scenarios:
  - Academic research; synthesis; cleaning and stain removal
- Protective equipment or measures:
  - Under local exhaust ventilation (LEV), or closed system
  - Wear **respiratory and skin PPE**
  - Conduct **on-site monitoring activities** to ensure that laborers' hazard exposure is under the permissible level

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Example. Sulfuric acid

- Hazards:
  - Fatal if inhaled
  - Harmful if swallowed
  - Causes severe skin burns and eye damage
  - May be corrosive to metals
- Applied scenarios:
  - Preparation of fertilizer; as electrolyte or catalyst
- Protective equipment or measures:
  - In case of contact with eyes, immediately wash with plenty of water and consult medical treatment
  - Do not add water to sulfuric acid
  - Wear protective gloves/protective clothing/eye protection.
  - Store in a well-ventilated place.

Obligations of employers

to protect labors' health and safety

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Obligations of employers

- ✓ Provide labels, inventories, and SDSs for hazardous chemicals
- ✓ Provide necessary protective equipment or measures, PPEs, and antidotes
- ✓ Provide safety and health education and training
- ✓ Conduct health examinations
  - Pre-employment and following health examinations
  - General or special health examinations
- ✓ Ensure that laborers' exposure is under the permissible level
  - Formulate on-site monitoring activities or exposure assessments

References

- GHS purple book Rev.8 (2019)
  https://unece.org/ghs-rev8-2019
- Occupational Safety and Health Act
  https://law.moj.gov.tw/LawClass/LawAll.aspx?pcode=N0060001
- Severe occupational injuries, OSHA
  https://www.osha.gov.tw/1106/1196/10141/

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Occupational injuries

Ways to prevent

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_ _

- Descriptions:

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Name of potentially hazardous work

- Possible hazards：

Pictures of hazardous work

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Common names/ trade names

- Chemical name:
- Hazard statements:
- Applied scenarios:
- Protective equipment or measures:
- Emergency response:

Label of the chemical

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