



Chemical Safety

University of Jordan
School of Agriculture
Committee of Safety



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Outline

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- + Elements of safety
- + Hazard classes and risks
- + Routes of exposure
- + Control of chemical hazards
- + General lab safety
- + Type of Hazards
- + Chemical hazards
- + GHS
- + Pictograms
- + SDS
- + Labels
- + Door signs
- + Spill kits
- + Hierarchy of controls
- + Personal protective equipment
- + Storage of chemicals
- + Chemical waste
- + Chemical Inventory
- + Laboratory safety plan
- + Auditing
- + Training



+ Learning objectives

- To increase the awareness of chemical hazards
- To learn where to seek information about chemical hazards in the laboratory
- To understand the standardized approach to communicating chemical hazards effectively
- To understand the measures of controlling chemical hazards

+ Elements of safety

- Three main elements of safety
 - Hazard awareness
 - Hazard protection
 - Emergency procedure

+ General lab safety

- No food or drink in the lab
- No smoking
- Dispose of waste properly
- Handle broken glassware carefully
- **Hand washing: Hands should be washed with soap and water frequently throughout the day. Hands should be washed after handling any hazardous materials, after the removal of gloves, and before leaving the laboratory.**
- Emergency exit should be clear
- Electricity safety
- Only authorized trained personnel enter the lab
- Door signs
- Avoid mouth pipetting and use mechanical pipettes instead.
- Place different lab wastes in their containers. Do not place them in the regular trash.
- Pay attention to sharps in the lab. Do not place them in the regular trash.
- Autoclave biological hazards before getting rid of them in the regular trash.
- All containers should be labeled properly (even water should be labeled so it won't be confused with other chemicals).
- Wear proper clothes.



- Lab coats
 - Closed shoes
 - Gloves
 - Safety glasses
- **Be thoughtful of other personnel in the lab, environment, animals, and sea life.**
 - Proper Communication is a key to preventing and handling different types of hazards.

+ Hazard classes and risks

+ Type of Hazards

+ Chemical hazards

+ Routes of exposure

- Ingestion
- Inhalation
- Injection
- Skin contact

+ Control of chemical hazards

+ Tools for communicating hazards

- GHS pictograms
- Label
- SDS sheet
- Laboratory door signs

+ GHS

+ GHS Pictograms

Nine pictograms are used to communicate different chemical hazards

These pictograms are based on the Globally Harmonized System (GSH).

To learn more about GHS and these pictograms follow the link

https://unece.org/fileadmin/DAM/trans/danger/publi/ghs/ghs_rev04/English/ST-SG-AC10-30-Rev4e.pdf



Figure1. GHS pictograms (adapted from First American Safety).



📄 Safety Data Sheet (SDS)

According to Hazard Communication Standard (HCS), the chemical manufacturer, distributor, or importer should provide Safety Data Sheet (SDS) for every hazardous chemical.

SDS was known previously as a material safety data sheet (MSDS).



Any SDS contains 16-section.

1. Section 1: Identification
2. Section 2: Hazard identification
3. Section 3: Composition/information on ingredients
4. Section 4: First aid measures
5. Section 5: Firefighting measures
6. Section 6: accidental release
7. Section 7: Handling and storage
8. Section 8: Exposure controls/ personal protection
9. Section 9: Physical and chemical properties
10. Section 10: Stability and reactivity
11. Section 11: Toxicological information
12. Section 12: Ecological information
13. Section 12: Disposable considerations
14. Section 14: Transport information
15. Section 15: Regulatory information
16. Section 16: other information

Basically, most of the information you need to know about your chemicals, their hazards, and how to handle these chemicals can be found in the SDS. SDS is your invaluable resource in labs.

How to get the SDS for a chemical: It's pretty easy to find the SDS for a chemical compound. You can simply google it like this:

Chloroform SDS Sigma Aldrich

<https://www.sigmaaldrich.com/JO/en/sds/SIAL/288306>

Or

Chloroform SDS ThermoFisher Scientific

<https://www.fishersci.com/store/msds?partNumber=AC610281000&productDescription=CHLOROFORM+ANHYD&vendorId=VN00033901&countryCode=US&language=en>

For more details about SDS please follow the link

<https://www.osha.gov/sites/default/files/publications/OSHA3514.pdf>



- ✚ **Labels**
- ✚ **Door signs**
- ✚ **Spill kits**
- ✚ **Hierarchy of controls**
- ✚ **Personal protective equipment**
- ✚ **Storage of chemicals**
- ✚ **Chemical waste**
- ✚ **Chemical Inventory**
- ✚ **Laboratory safety plan**
- ✚ **Auditing**
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