



# Hazmat

# Training Handout



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# Module 1:

# Introduction to

# Hazardous

# Materials



# 1. Definition of HAZMAT

Hazardous materials (HAZMAT) are substances that pose a potential risk to people, property, or the environment due to their chemical, physical, or biological characteristics. These materials can be in the form of solids, liquids, or gases, and are considered dangerous during handling, transportation, or storage.

Examples include:

- Flammable liquids (like gasoline)
- Toxic gases (like chlorine)
- Corrosive substances (like sulfuric acid)
- Radioactive materials

## 2. Types of Hazardous Materials

Hazardous materials are categorized based on their nature and risk level. Some common types include:

- Chemical hazards: Such as acids, bases, solvents, and flammable liquids.
- Biological hazards: Like bloodborne pathogens, bacteria, and viruses.
- Radiological hazards: Materials that emit radiation, e.g., uranium or medical isotopes.
- Physical hazards: Compressed gases or materials prone to explosion or ignition.



### 3. Importance of HAZMAT Awareness

HAZMAT awareness is crucial for several reasons:

- Safety of workers and the public: Knowing how to recognize and respond to hazardous materials prevents accidents and injuries.
- Environmental protection: Proper handling and disposal prevent pollution and long-term ecological damage.
- Legal compliance: Awareness helps organizations follow laws and avoid fines, shutdowns, or legal action.
- Emergency preparedness: Trained personnel can respond quickly and correctly to leaks, spills, or fires.



## 4. Regulatory Bodies

Several local and international organizations regulate the handling of hazardous materials to ensure safety:

- OSHA (Occupational Safety and Health Administration)
  - U.S. agency that sets workplace safety standards.
- DOT (Department of Transportation) – Regulates the transportation of HAZMAT.
- EPA (Environmental Protection Agency) – Oversees environmental protection and waste disposal.
- NFPA (National Fire Protection Association) – Publishes codes and standards related to fire safety, including HAZMAT storage and identification.



- IAEA (International Atomic Energy Agency) – Oversees international use of radioactive materials.
- UN (United Nations) – Sets global standards for HAZMAT classification and transport (e.g., UN numbers).

Note: Depending on your country, there may be local equivalents of these organizations that set HAZMAT guidelines and training requirements.



# Module 2:

## Hazard

# Classification



Hazardous materials are classified into 9 primary classes (and subdivisions) according to their physical and chemical properties. This classification helps workers, transporters, and responders identify the risks and apply the right safety procedures.



# Class 1: Explosives

These are materials or items that can cause a sudden release of gas, heat, and pressure (an explosion).

- Divisions: 1.1 to 1.6 (based on explosion risk and effect)
- Examples: Dynamite, fireworks, ammunition, blasting caps
- Risks: Shockwaves, fire, flying debris, injury, death

Key Handling Tip: Avoid friction, heat, or impact. Only trained personnel should handle.



## Class 2: Gases

Compressed or liquefied gases pose hazards through pressure release, flammability, toxicity, or asphyxiation.

- Subdivisions:
  - 2.1 – Flammable gases (e.g., propane, butane)
  - 2.2 – Non-flammable, non-toxic gases (e.g., nitrogen, helium)
  - 2.3 – Toxic gases (e.g., chlorine, phosgene)

Risks: Fire, explosion, poisoning, suffocation

Key Handling Tip: Store in upright cylinders, ensure proper ventilation.



# Class 3: Flammable Liquids

Liquids that produce flammable vapors at certain temperatures.

- Examples: Gasoline, ethanol, acetone, paint thinners
- Risks: Fire, explosion, toxic fumes
- Key Handling Tip: Keep away from ignition sources and store in sealed containers.



# Class 4: Flammable Solids

Solids that are easily ignited or can cause fire through friction or contact with air/moisture.

- Subdivisions:
  - 4.1 – Flammable solids (e.g., matches, magnesium)
  - 4.2 – Spontaneously combustible materials (e.g., phosphorus)
  - 4.3 – Dangerous when wet (e.g., sodium metal, calcium carbide)

Risks: Fire, toxic gas release, explosions

Key Handling Tip: Keep dry and cool. Separate incompatible materials.



# Class 5: Oxidizers and Organic Peroxides

Substances that cause or intensify combustion of other materials.

- 5.1 – Oxidizers (e.g., hydrogen peroxide, ammonium nitrate)
- 5.2 – Organic peroxides (e.g., benzoyl peroxide)

Risks: Fire, explosion, corrosiveness

Key Handling Tip: Do not store with flammables. Avoid contamination.



# Class 6: Toxic and Infectious Substances

Materials that can cause injury or death if inhaled, swallowed, or absorbed through the skin.

- 6.1 – Toxic substances (e.g., pesticides, cyanide)
- 6.2 – Infectious substances (e.g., medical waste, lab samples with pathogens)

Risks: Poisoning, infection, environmental contamination

Key Handling Tip: Use proper PPE and containment.

Dispose of waste safely.



## Class 7: Radioactive Materials

Materials that emit ionizing radiation, which can damage cells and tissues.

- Examples: Uranium, cobalt-60, medical isotopes

Risks: Radiation sickness, cancer, contamination

Key Handling Tip: Use lead shielding and radiation monitoring devices. Limit exposure time.



## Class 8: Corrosives

Substances that cause severe damage to living tissue or materials on contact.

- Examples: Sulfuric acid, sodium hydroxide, hydrochloric acid

Risks: Burns, respiratory damage, structural damage to containers

Key Handling Tip: Use acid-resistant gloves and goggles.  
Store separately from incompatible substances.



# Class 9: Miscellaneous Dangerous Goods

Materials that pose hazards not covered in other classes.

- Examples: Lithium batteries, dry ice, environmentally hazardous substances

Risks: Fire, explosion, toxic release

Key Handling Tip: Follow manufacturer and regulatory guidelines closely.



# Module 3:

# Labels, Placards,

# and Markings

# 1. HAZMAT Symbols and Colors

Hazardous materials are marked with standard symbols, colors, and shapes that represent their classification and danger level.

- Diamond shape (square-on-point): The universal format for HAZMAT labels and placards
- Colors indicate the type of hazard:
  - ● Red – Flammability
  - ● White – Health hazard or corrosive
  - ● Black – Corrosive or toxic substances
  - ● Yellow – Reactivity (explosives, oxidizers)
  - ● Blue – Health hazard or water-reactive
  - ● Green – Non-flammable gases

Symbols indicate specific hazards:

- Flame (🔥) – Flammable
- Skull and crossbones (💀)
  - Toxic
- Cylinder – Compressed gas
- Corrosion on hand/surface
  - Corrosive
- Exploding bomb – Explosive
- Radioactive trefoil – Radioactive





## 2. Proper Labeling Requirements

Labels are small, diamond-shaped signs (usually 100 mm x 100 mm) placed on individual packages of hazardous materials. They must:

- Match the hazard class of the material inside
- Include:
  - Hazard class number (e.g., "3" for flammable liquid)
  - Pictogram or symbol (e.g., flame)
  - Color code corresponding to the hazard



## Label Placement:

- Must be clearly visible on the outer package surface
- Must not be obscured or placed over seams, corners, or edges

## Additional info (if applicable):

- Orientation arrows for liquids
- Handling instructions ("Keep Away from Heat," etc.)

### 3. Placarding for Transport Vehicles

Placards are larger versions of labels used on trucks, railcars, tankers, or cargo containers to identify the type of hazardous materials they are transporting.

Regulations require placards when:

- The quantity of hazardous materials exceeds threshold limits
- The materials are especially dangerous (e.g., explosives, toxic gases)



## Placard Features:

- Same design principles as labels
- Must be displayed on all four sides of the vehicle or container
- Includes the UN number or hazard class

Purpose: Helps first responders, law enforcement, and the public recognize dangers from a distance.



## 4. Identification Numbers (UN/NA Codes)

Every hazardous material is assigned a UN (United Nations) or NA (North America) number that uniquely identifies it.

- Format: Four-digit number (e.g., UN1203 = gasoline, UN1090 = acetone)
- Found on:
  - Shipping papers
  - Labels and placards
  - SDS (Safety Data Sheets)



## Purpose:

- Used by emergency responders to access hazard details from the Emergency Response Guidebook (ERG)
- Ensures accurate communication across countries and transport modes

## Example:

- UN 1977 – Nitrogen, refrigerated liquid
- UN 1789 – Hydrochloric acid



# Summary of Key Points

Feature	Used On	Purpose
Labels	Packages	Identify material hazards
Placards	Vehicles/Containers	Warn public and responders
Symbols	Both	Show nature of hazard (fire, toxic, etc.)
UN Numbers	Both	Track and identify material



# **Module 4:**

# **Safety Data**

# **Sheets (SDS)**



The Safety Data Sheet (SDS)—formerly known as Material Safety Data Sheet (MSDS)—is a detailed document that provides essential information about a hazardous material. It is designed to help workers understand how to safely handle, store, transport, and respond to emergencies involving the substance.



# 1. What an SDS Is

An SDS is a standardized, 16-section document that provides comprehensive information about a chemical or hazardous product.

- It is required by law (e.g., OSHA Hazard Communication Standard, GHS guidelines).
- It must be readily accessible to employees who handle hazardous materials.
- It includes health risks, physical properties, precautions, and emergency procedures.

Purpose: To ensure everyone—from warehouse staff to emergency responders—knows how to safely interact with the substance.

## 2. Sections of an SDS

Here are the 16 sections of a typical SDS under the Globally Harmonized System (GHS):

### 1. Identification

- Product name, manufacturer details, recommended use
- Emergency contact number

### 2. Hazard Identification

- GHS label elements (symbols, signal words)
- Hazard classification (e.g., flammable, toxic)
- Precautionary statements



### 3. Composition/Information on Ingredients

- Chemical ingredients and concentrations
- CAS (Chemical Abstract Service) numbers

### 4. First-Aid Measures

- Symptoms and signs of exposure
- Emergency first-aid actions for eyes, skin, inhalation, ingestion

### 5. Fire-Fighting Measures

- Suitable extinguishing media
- Hazards from combustion (e.g., toxic fumes)
- PPE for firefighters



## 6. Accidental Release Measures

- Spill or leak containment procedures
- Cleanup instructions
- PPE requirements

## 7. Handling and Storage

- Safe handling practices
- Storage conditions (e.g., temperature, ventilation)
- Incompatibilities

## 8. Exposure Controls/Personal Protection

- Exposure limits (OSHA, ACGIH)
- Recommended PPE (gloves, goggles, respirators)



## 9. Physical and Chemical Properties

- Boiling point, melting point, appearance, odor
- Flammability, solubility

## 10. Stability and Reactivity

- Reactivity hazards
- Incompatible materials
- Conditions to avoid

## 11. Toxicological Information

- Routes of exposure
- Symptoms of overexposure
- Long-term health risks



## 12. Ecological Information (non-mandatory)

- Environmental impact
- Persistence, bioaccumulation potential

## 13. Disposal Considerations (non-mandatory)

- Safe waste disposal methods
- Disposal containers and regulations

## 14. Transport Information

- UN number, hazard class, packing group
- Marine pollutant status



## 15. Regulatory Information

- Safety, health, and environmental regulations specific to the chemical

## 16. Other Information

- Preparation/revision date
- Additional safety notes

# 3. How to Read and Use an SDS for Safe Handling



Understanding an SDS helps prevent accidents and ensures safe chemical management. Here's how workers should use it:

- Before Use: Review Sections 1–3 to confirm identity and associated hazards.
- While Using: Refer to Sections 7–9 to follow safe handling and PPE guidance.
- In Case of Emergency: Quickly check Sections 4–6 for first aid, fire, and spill response.
- During Disposal or Transport: Refer to Sections 13–14 for compliant and safe practices.



# Summary

SDS Section Group	Purpose
1–3	Basic identification and chemical makeup
4–6	Emergency response (first aid, fire, spill)
7–9	Handling, PPE, and properties
10–12	Chemical behavior and environmental impact
13–16	Disposal, transport, and regulations



# Module 5:

# Handling and

# Storage



Improper handling or storage of hazardous materials can lead to serious health risks, fires, explosions, leaks, and environmental contamination. This module provides essential guidelines for safely managing hazardous materials from receipt to disposal.

# 1. Safe Handling Procedures

## General Handling Rules:

- Always read the Safety Data Sheet (SDS) before use.
- Use appropriate PPE: gloves, goggles, face shield, protective clothing.
- Never eat, drink, or smoke while handling hazardous materials.
- Handle materials in well-ventilated areas to prevent inhalation of vapors or gases.
- Use mechanical aids (e.g., carts, trolleys) to move heavy or unstable containers.
- Avoid direct contact with skin or eyes—treat all spills and splashes seriously.
- Keep incompatible chemicals separated during handling.
- Always label opened containers with content name and hazard information.
- Do not mix chemicals unless trained and authorized to do so.



## 2. Proper Storage Practices

Hazardous materials must be stored in a way that prevents leaks, contamination, or reactions. Improper storage can lead to fires, exposure, or environmental incidents.

### Storage Area Requirements:

- Store in cool, dry, well-ventilated areas, away from direct sunlight and ignition sources.
- Use explosion-proof equipment in areas storing flammable materials.
- Ensure secondary containment (e.g., drip trays, spill pallets) to capture leaks or spills.
- Lock hazardous storage areas with restricted access to authorized personnel only.
- Install proper signage: “Danger: Flammable,” “Corrosive,” or “Toxic.”



## Container Guidelines:

- Use only approved, compatible containers (no food or drink containers).
- Keep containers tightly sealed when not in use.
- Clearly label all containers with:
  - Chemical name
  - Hazard class/symbol
  - Date received/opened
- Inspect containers regularly for corrosion, bulging, leaks, or damage.

### 3. Segregation of Incompatible Materials

Certain hazardous materials react dangerously when stored together. Segregation prevents fires, explosions, or toxic gas releases.

Incompatible Materials	Dangerous Reaction
Acids + Bases	Violent neutralization (heat, gas)
Acids + Cyanides/Sulfides	Poisonous gases (e.g., HCN)
Oxidizers + Flammables/Organics	Fire or explosion
Peroxides + Metals or Heat	Explosion
Water-reactive materials + Water	Fire, toxic gas, heat



## 4. Temperature, Ventilation, and Light Requirements

Environmental controls help maintain the stability of hazardous materials.

### Temperature:

- Store flammables and volatiles below flash points (often under 25°C/77°F).
- Keep temperature-sensitive materials in refrigerated cabinets.
- Avoid extreme heat/cold that may cause container rupture or reaction.



## Ventilation:

- Use fume hoods or exhaust systems for materials that release vapors or dust.
- Keep storage rooms ventilated to avoid buildup of explosive gases.

## Light Exposure:

- Some chemicals are light-sensitive and degrade or react under sunlight (e.g., hydrogen peroxide).
- Use opaque or UV-protected containers and keep them in dark cabinets.



## Summary of Key Points

### Safety Focus

Handling

Storage

Segregation

Environment Control

### Best Practices

Use PPE, avoid spills, label all containers

Keep areas dry, ventilated, secure

Store incompatible chemicals separately

Monitor temperature, ventilation, and lighting



# Module 6:

# Emergency

# Response

# Procedures



In any workplace or transport setting where hazardous materials are present, emergencies can occur suddenly and escalate quickly. This module provides structured procedures for recognizing, reporting, and responding to spills, leaks, fires, or exposure incidents.

# 1. Recognizing HAZMAT Emergencies



A HAZMAT emergency can result from human error, equipment failure, environmental conditions, or accidents. Recognizing early warning signs is key to preventing escalation.

## Signs of a HAZMAT Emergency

- Strong, unusual odors (chemical, rotten eggs, burning plastic)
- Leaking containers, visible spills, or vapors
- Alarms or detector alerts (gas, smoke, pressure)
- Physical symptoms: dizziness, nausea, burning eyes, difficulty breathing
- Fire, smoke, or visible flames near chemical storage
- Unusual noise from equipment (e.g., hissing gas)



## Immediate Response:

- Stop and assess—do not rush in.
- Alert others nearby and evacuate the area if necessary.
- Avoid contact or inhalation—do not touch or smell unknown substances.



## 2. Evacuation Procedures

Evacuation is necessary when a HAZMAT incident presents a danger to personnel. A well-planned evacuation saves lives and minimizes confusion.

### Steps to Follow:

- Sound the alarm or follow internal emergency communication procedures.
- Move upwind and uphill of the incident (hazardous gases sink and flow with wind).
- Use designated evacuation routes and exits.
- Assist persons with disabilities or injuries if it is safe to do so.
- Do not re-enter the area until cleared by emergency personnel.



## Assembly Points:

- Must be located at a safe distance
- Everyone must check in at the assembly point or muster station

## Accountability:

- Supervisors must take a headcount to identify missing personsust check in at the assembly point or muster station

### 3. First Aid Measures

When exposure occurs, quick and correct first aid can reduce harm or save a life. The exact procedure depends on the type of material involved.

#### Basic First Aid by Exposure Type:

Exposure Type	Action
Skin Contact	Remove contaminated clothing, rinse skin with water for 15–20 minutes
Eye Contact	Rinse eyes with eyewash or clean water for 15–20 minutes, keep eyelids open
Inhalation	Move to fresh air immediately, keep airway open, administer oxygen if trained
Ingestion	Do not induce vomiting unless instructed by poison control or SDS

# 4. Spill and Leak Control

Spill response aims to contain and clean up hazardous releases while protecting people and the environment.



## Spill Response Steps:

- Alert and Evacuate the area if necessary.
- Identify the material using labels, placards, or SDS.
- Wear PPE appropriate for the hazard (e.g., gloves, respirator).
- Stop the leak at the source (if safe).
- Contain the spill using absorbents, dikes, or barriers.
- Clean up and dispose of materials in approved containers.

## Reporting:

- Notify supervisor or HAZMAT team immediately.
- Follow internal and external reporting requirements (e.g., environmental agency, fire department).



## 5. Fire and Explosion Response

Fires involving hazardous materials require specific extinguishing agents and procedures.

### Basic Fire Response Steps:

- Activate fire alarm
- Call emergency services immediately
- Evacuate the area without delay
- Use a fire extinguisher only if:
  - You're trained
  - The fire is small and contained
  - You have a clear escape route



## Firefighting Considerations:

- Know which extinguisher type is needed:
  - Class B – Flammable liquids
  - Class C – Electrical fires
  - Special agents (e.g., foam, CO<sub>2</sub>) for chemical fires
- Some materials (e.g., oxidizers, water-reactive) may worsen fires if improperly extinguished



# Summary of Emergency Protocols

Emergency Type	Immediate Actions
Exposure	Use appropriate first aid, call for medical help
Spill	Evacuate, contain, use PPE, notify authorities
Fire	Evacuate, activate alarm, use correct extinguisher if safe
Evacuation	Follow routes, report to assembly point, do headcount



# Module 7:

# Personal

# Protective

# Equipment (PPE)



Personal Protective Equipment (PPE) refers to specialized clothing and gear worn to protect against chemical, biological, radiological, and physical hazards. When engineering and administrative controls are not enough, PPE serves as the last line of defense.



# 1. Types of PPE Used in HAZMAT Situations

Different hazards require different types of PPE. The type of chemical, form (gas, liquid, solid), and level of exposure risk determine what PPE is needed.

## Basic Fire Response Steps:

PPE Type	Description	Used For
Gloves	Chemical-resistant (e.g., nitrile, neoprene)	Prevent hand contact with corrosive or toxic materials
Eye Protection	Safety goggles, face shields	Protect eyes from splashes, vapors, or flying particles
Respiratory Protection	Masks, respirators (air-purifying, SCBA)	Prevent inhalation of toxic gases, dust, or vapors
Body Protection	Coveralls, aprons, chemical suits	Shield the body from contact or splash exposure
Foot Protection	Chemical-resistant boots	Prevent chemical absorption or injury to feet
Hearing Protection	Earplugs, earmuffs	Used in noisy environments with industrial machinery

## 2. Proper Use and Maintenance of PPE

Knowing how to correctly wear, adjust, clean, and store PPE is essential to ensure its effectiveness.



### General Guidelines:

- Inspect PPE before each use—look for holes, cracks, wear, or contamination.
- Put on PPE (donning) in the correct order (e.g., gloves last).
- Remove PPE (doffing) carefully to avoid self-contamination (e.g., turn gloves inside-out).
- Clean reusable PPE after use (per manufacturer's instructions).
- Store PPE in a clean, dry, and well-ventilated area, away from chemicals or direct sunlight.
- Do not reuse single-use (disposable) PPE.



### 3. Selecting the Right PPE for the Hazard

PPE selection should be based on the hazard assessment of the specific job or task.

#### Factors to Consider:

- Chemical identity and concentration
- Physical state (liquid, vapor, powder)
- Duration and frequency of exposure
- Work environment conditions (temperature, ventilation)
- Compatibility with other PPE (e.g., masks and goggles must seal properly)



## 4. PPE Limitations

While PPE provides protection, it has limits and should not replace other safety measures.

### Common Limitations:

- Improper use or fit can reduce protection (e.g., loose masks)
- Some PPE is not chemical-specific
- PPE can become contaminated or degraded over time
- May reduce mobility, visibility, and comfort
- Respirators may restrict breathing and require fit testing and training



## Summary: PPE Best Practices

Do:	Don't:
Wear the right PPE for the specific chemical and task	Assume all PPE protects against every chemical
Inspect and fit PPE properly	Reuse disposable PPE
Follow donning/doffing procedures	Skip PPE because of inconvenience
Clean and store PPE correctly	Mix and match incompatible PPE gear



# **Module 8:**

# **Transportation of**

# **Hazardous**

# **Materials**



Transporting hazardous materials (HAZMAT) comes with serious risks including spills, explosions, environmental contamination, and public safety hazards. This module provides the essential regulations, procedures, and safety measures required for compliant and secure transport.



## 1. Regulations Governing HAZMAT Transportation

Hazardous materials transportation is heavily regulated at both national and international levels to protect public safety.



## Key Regulations:

- Nigeria: National Environmental (Hazardous Chemicals and Pesticides) Regulations
- USA: U.S. Department of Transportation (DOT) – 49 CFR Parts 100–185
- International:
  - ADR – European Agreement for Road Transport of Dangerous Goods
  - IMDG Code – International Maritime Dangerous Goods (for sea)
  - ICAO/IATA Regulations – for air transport
  - UN Recommendations – globally harmonized system



## 2. Labeling and Placarding Requirements

Proper labeling and placarding are crucial for quick identification during handling or emergencies.

### Labels:

Applied to individual containers (e.g., drums, boxes, cylinders)

Must include:

- Hazard class symbol (flammable, corrosive, toxic, etc.)
- UN number (e.g., UN1203 for gasoline)
- Proper shipping name

Labels must be:

- Legible
- In English
- Weather-resistant



## Placards:

- Large diamond-shaped signs placed on transport vehicles
- Required for bulk quantities or certain hazard classes
- Color-coded and symbol-based to show type of danger (e.g., red for flammables)



### 3. Documentation and Shipping Papers

Every HAZMAT shipment must be accompanied by accurate and complete documentation.

#### Common Documents:

- Shipping Paper / Manifest
- Material Safety Data Sheet (MSDS or SDS)
- Emergency Contact Info
- Declaration of Dangerous Goods (for international shipping)



## Shipping Paper Must Include:

- Proper Shipping Name
- UN Number
- Hazard Class
- Packing Group (I – high danger, II – medium, III – low)
- Quantity and type of packaging
- Emergency response information



## 4. Driver and Vehicle Requirements

Drivers and vehicles transporting hazardous materials must meet strict standards.

### Driver Requirements:

- Special training or certification for transporting HAZMAT (e.g., tanker or explosive endorsements)
- Must understand:
- Nature of the materials being transported
- Emergency response procedures
- Spill containment steps



## Vehicle Requirements:

Vehicles must be:

- Roadworthy, regularly inspected
- Equipped with fire extinguishers, spill kits, and emergency warning devices

Some HAZMAT requires:

- Special tanks or pressure containers
- Secondary containment or venting systems

Tracking and communication systems may be mandatory for high-risk cargo



## 4. Driver and Vehicle Requirements

Proper loading and unloading prevent leaks, spills, and accidental reactions.

### Safe Loading Steps:

- Park in a secure, flat, and well-ventilated area
- Use grounding/bonding wires when loading flammable liquids
- Check all containers for leaks or damage
- Ensure segregation of incompatible materials
- Secure loads using straps, blocks, or bracing



## Do NOT:

- Load incompatible substances side-by-side (e.g., acids with oxidizers)
- Leave unattended vehicles unlocked during transport

## Safe Unloading:

- Wear proper PPE
- Follow procedures for depressurizing or venting if required
- Inspect receiving containers before transferring



# Summary: Key Transportation Safety Points

Safety Element	Key Requirements
Regulations	Follow national and international laws
Labeling	Accurate, visible hazard symbols and UN numbers
Documentation	Complete shipping papers with emergency info
Driver & Vehicle	Must be certified and fully equipped
Loading/Unloading	Secure materials, avoid incompatible mixes



# Module 9:

# Waste Disposal

## and

# Environmental

# Protection



Improper disposal of hazardous waste can lead to air, water, and soil contamination, serious health risks, and major legal consequences. This module teaches how to properly handle, classify, store, and dispose of hazardous waste while protecting the environment and complying with the law.



# 1. Identifying and Classifying Hazardous Waste

Hazardous waste is any waste that poses a substantial or potential threat to public health or the environment.

## Waste Types:

- Solid Waste: Contaminated soil, used PPE, absorbents
- Liquid Waste: Spilled chemicals, cleaning solvents
- Gas Waste: Leaked vapors from containers
- Medical/Biohazard Waste: If applicable to your operations



## 2. Proper Waste Segregation and Storage

Mixing incompatible wastes can lead to fire, explosions, or toxic releases. Proper segregation and containment are essential.

### Segregation Rules:

- Keep incompatible materials separate (e.g., acids away from bases, oxidizers away from fuels).
- Use color-coded or labeled bins for different waste types.



- Always label waste containers with:
  - Type of waste
  - Hazard symbols
  - Date of accumulation

## Storage Guidelines:

- Use approved containers that are leak-proof and chemical-resistant.
- Store in well-ventilated, secure areas away from drains and ignition sources.
- Keep waste containers sealed when not in use.
- Follow the "first in, first out" rule to avoid long-term accumulation.

### 3. Disposal Methods and Legal Requirements

Hazardous waste cannot be disposed of like regular trash. It must go through licensed treatment and disposal facilities.

#### Legal Disposal Methods:

- Incineration: Burns waste at high temperatures (used for toxic or infectious materials)
- Neutralization: Treating chemicals to render them non-hazardous
- Stabilization/Solidification: Immobilizes hazardous components
- Land Disposal: In specialized hazardous waste landfills only

## Legal Considerations:

- You must comply with local environmental laws and international agreements (e.g., Basel Convention).
- Maintain waste manifests that track movement from generation to disposal.
- Only use licensed transporters and disposal companies.



## 4. Spill Containment and Cleanup

Even with best practices, spills can occur. A good containment and cleanup plan protects workers, the public, and the environment.

### Containment Tools:

- Spill kits with absorbents, neutralizers, booms, and pads
- Secondary containment (trays, berms, sealed floors)
- Drain covers or temporary barriers



## Spill Cleanup Steps:

- Alert nearby personnel and evacuate if needed.
- Wear appropriate PPE.
- Contain the spill to prevent spreading.
- Absorb or neutralize the spill.
- Place cleanup waste in properly labeled containers for disposal.
- Report the spill and document the cleanup process.

## 5. Minimizing Environmental Impact

Beyond compliance, companies should take proactive steps to reduce their environmental footprint.

### Sustainable Practices:

- Reduce waste generation through smart inventory and chemical reuse.
- Recycle solvents, metals, and non-contaminated materials where possible.
- Switch to safer or greener alternatives when available.
- Conduct regular audits and training to improve waste management.
- Install monitoring systems to detect leaks, spills, or emissions early.



# Summary Table

Waste Handling Area	Key Action
Classification	Identify by hazard characteristics
Segregation	Separate incompatible materials
Storage	Label, seal, and contain securely
Disposal	Use legal, licensed facilities
Spill Cleanup	Contain, neutralize, report, and document
Sustainability	Reuse, recycle, and reduce where possible