

The background of the top half of the slide is a close-up photograph of blue fabric, possibly a shirt collar and ribbed cuffs, with a teal overlay. A red vertical bar is on the left side of the teal overlay.

Chemicals Management in Textile Factories

Promotion for Sustainability in the Textile and Garment Industry in Asia-FABRIC

Chemical Management in Textile Factories

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on behalf of giz FABRICS and adelphi consult GmbH Berlin



Module II: Agenda

- ✓ Importance of chemical management
- ✓ Understanding standard labels and their implications
- ✓ Key aspects of chemical management system
- ✓ Storage and transportation of different hazardous chemicals
- ✓ Handling of unused/expired chemicals
- ✓ Documentation for the storage, incidents, and mitigation (with templates)

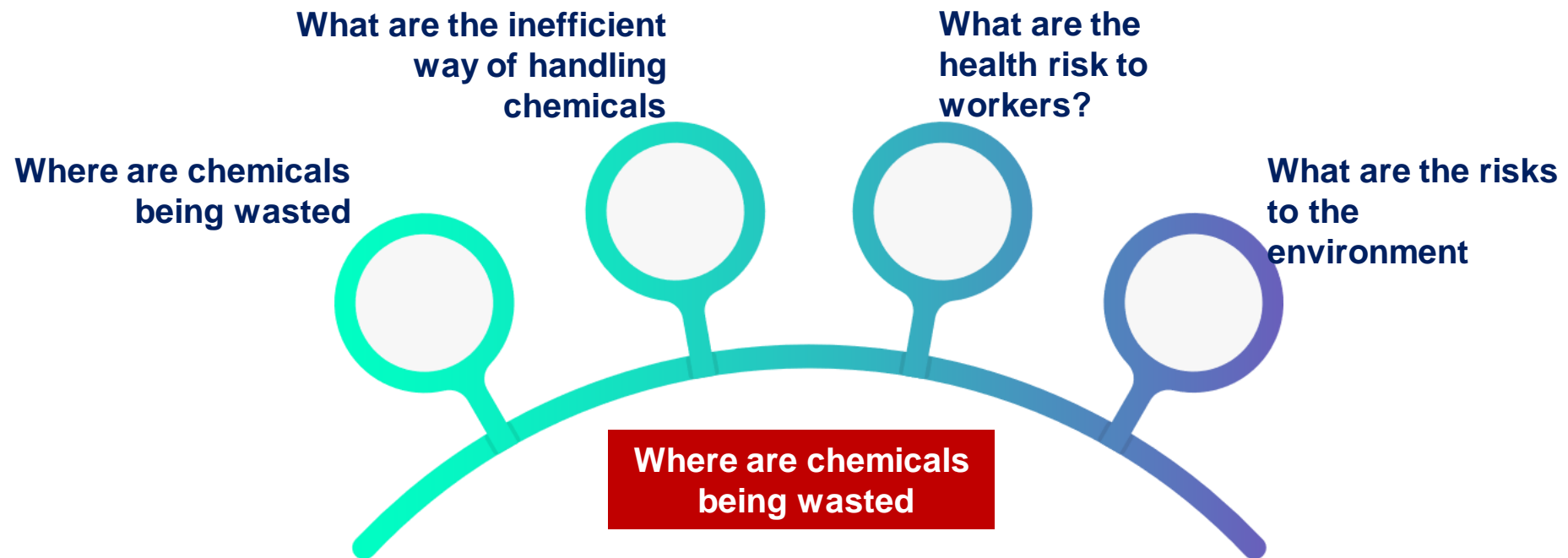
Importance of Chemical Management

Importance of Chemical Management



- ✓ Chemicals are crucial components of major process industries (e.g. textiles)
- ✓ Effectively managed chemicals can deliver financial and environmental benefits.
- ✓ Chemicals are necessary to achieve characteristics and qualities in a product,
- ✓ However,
 - There is growing concern about harmful chemicals in the products and their adverse effects on health and environment.
 - the frameworks for standards, legal and other requirements become increasingly demanding

Elements of Chemical Management



Elements of Good Chemical Management

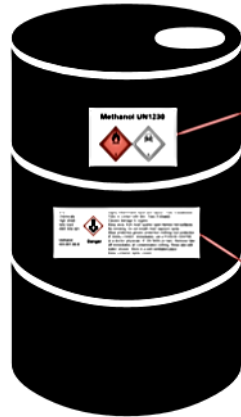
- Establish purchase policy and practices
 - Control exposure and releases
 - Select and use personal protective equipment
 - Provide training, procedures and instructions
 - Improve chemical handling
 - Safe chemical storage
 - Safe chemical transport
 - Plan and prepare for chemical emergencies
 - Manage and dispose chemical waste

Chemical Labelling and Marking

- Every single chemical container in the factory shall be clearly identified with printed labels on the containers.
- Chemical containers that have not been labelled shall not be used until the relevant information is obtained from the supplier or other reliable sources.
- Labels on the containers shall follow the standard of the Globally Harmonized System of Chemical Classification and Labelling (GHS) or a similar uniform and recognized system.
- Besides the GHS label requirements, the following information should also be present on the container label: (i) The lot number or batch number (ii) Date of manufacture and expiry date.
- Proper labelling shall also be applied to the chemical waste containers.

Chemical Labelling and Marking

Proper shipping name and UN number



Methanol UN1230

Transport Labels

Chemical name and product identifier

XYZ
Chemicals
High street
New town
0987 654 321

Danger

Methanol
603-001-00-X

Highly inflammable liquid and vapour. Toxic if swallowed. Toxic in contact with skin. Toxic if inhaled. Causes damage to organs. Keep away from heat/ sparks/ open flames/ hot surfaces- No smoking. Do not breath mist/ vapours/ spray. Wear protective gloves/ protective clothing/ eye protection. IF SWALLOWED: Immediately call a POISON CENTRE or a doctor/ physician. IF ON SKIN (or hair): Remove/ take off immediately all contaminated clothing. Rinse skin with water/ shower. Store in a well ventilated place. Keep container tightly closed.

Pictograms and signal words

Hazard and precautionary statements

Source: UNIDO IAMC toolkit, 2015

Basic Part of GHS Compliant Label

The Basic Parts of A GHS-Compliant Label

1 → **n-Propyl Alcohol**

UN No. 1274
CAS No. 71-23-8

2 → **DANGER**

3 → Highly flammable liquid and vapor. Causes serious eye damage.
May cause drowsiness and dizziness.

4 → Keep away from heat/sparks/open flames/hot surfaces. No smoking. Avoid breathing fumes/mist/vapours/spray. Wear protective gloves/protective clothing/eye protection/face protection. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses if present. Continue rinsing.

Fill Weight: 18.65 lbs. Lot Number: B56754434
Gross Weight: 20 lbs. Fill Date: 6/21/2013
Expiration Date: 6/21/2020

5 → Acme Chemical Company • 711 Roadrunner St. • Chicago, IL 60601 USA • www.acmechem.com • 123-444-5567

See SDS for further information.








6 → Pictograms: Flammable liquid, Health hazard, Corrosive

- 1. Product Identifier** - Should match the product identifier on the Safety Data Sheet.
- 2. Signal Word** - Either use "Danger" (severe) or "Warning" (less severe)
- 3. Hazard Statements** - A phrase assigned to a hazard class that describes the nature of the product's hazards
- 4. Precautionary Statements** - Describes recommended measures to minimize or prevent adverse effects resulting from exposure.
- 5. Supplier Identification** - The name, address and telephone number of the manufacturer or supplier.
- 6. Pictograms** - Graphical symbols intended to convey specific hazard information visually.

Sample label courtesy of Weber Packaging Solutions • www.weberpackaging.com

Exercise

Match the labels with the description

1		5	
2		6	
3		7	
4			

	Danger Fatal if ...		Danger Toxic if...		Danger Causes severe skin burns/eye damage
	Warning Cause skin irritation		Danger Explosive ...		Danger May cause cancer
	Warning Very toxic to aquatic life		Danger Extremely flammable		Warning Harmful if...

Safety Data Sheet (SDS)

There are 16 standard sections

- SECTION 1: Identification of the substance/mixture and of the company
- SECTION 2: Hazards identification
- SECTION 3: Composition/information on ingredients
- SECTION 4: First aid measures
- SECTION 5: Firefighting measures
- SECTION 6: Accidental release measure
- SECTION 7: Handling and storage
- SECTION 8: Exposure controls/personal protection
- SECTION 9: Physical and chemical properties
- SECTION 10: Stability and reactivity
- SECTION 11: Toxicological information
- SECTION 12: Ecological information
- SECTION 13: Disposal considerations
- SECTION 14: Transport information
- SECTION 15: Regulatory information
- SECTION 16: Other information

Safety Data Sheet (SDS)

Use of SDS Document:

- Identity of the substance
- Its physical, health and environmental hazards
- Storage, handling, transport and final disposal
- Safety instructions for workers
- Selection of exposure controls and PPE
- Emergency procedures (e.g. fire fighting, first aid, spill control)
- ...so on

Chemical and Waste Inventories

Provides a comprehensive list of the chemicals entering the production facility.

In the context of resource efficient management of chemicals, the purpose of chemical inventory goes beyond warehousing requirements:

- It serves as key reference
- It can be used for identification and assessment of environment, health & safety hazards and risk
- It can be used as chemical management information tool

Chemical and Waste Inventories

Template 1: Chemical Inventory List

Factory Location:

Location:

Updated by:

Date:

Area/ Process	Chemical/ Trade name	Manufacturer name	Formulator /Supplier name	Purchase information			CAS/ EC number	MRSL/RSL compliant (Yes/No)	SDS available (Yes/ No)	Function/ Use of the chemical	R-phrases/ Hazard statement	Hazard type			PPE required (as per SDS)	Storage condition (as per SDS)	Chemical In-stock	Chemical Used
				Date of purchase	Date of expiration	Batch/Lot number						P	H	E				

Elements of Inventories

Eco-map:

Type and location of chemicals and chemical (containing) waste

Process flow diagram and mass-balancing

Types of chemicals

Processes involving chemicals

Quantities of inputs and non-product outputs

Safety data sheets/technical data sheets/labels and markings

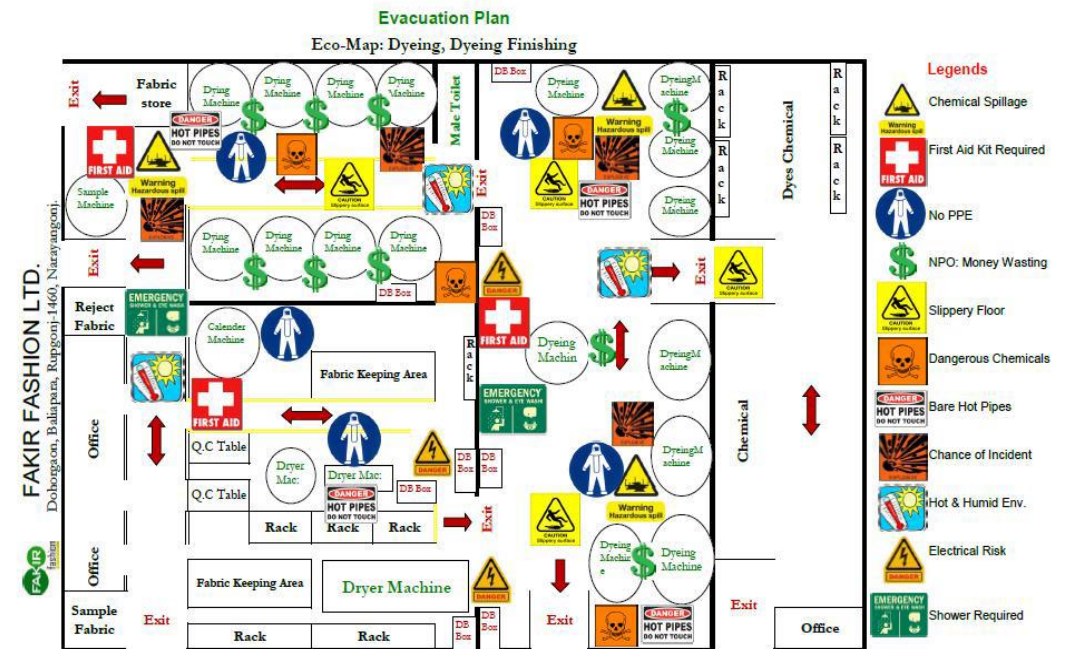
Hazardous/non-hazardous

Type of hazards



Eco Mapping

- simple, practical tool for visualization of process flows
- good to use in resource efficiency, OSH and/or chemical management for
 - identifying and documenting the prevalent situation and issues
 - identifying and analysing common issues and priorities
 - selecting and planning areas for improvement
 - monitoring progress of implementation
 - auditing and reporting



Concept of Process Flow Mapping

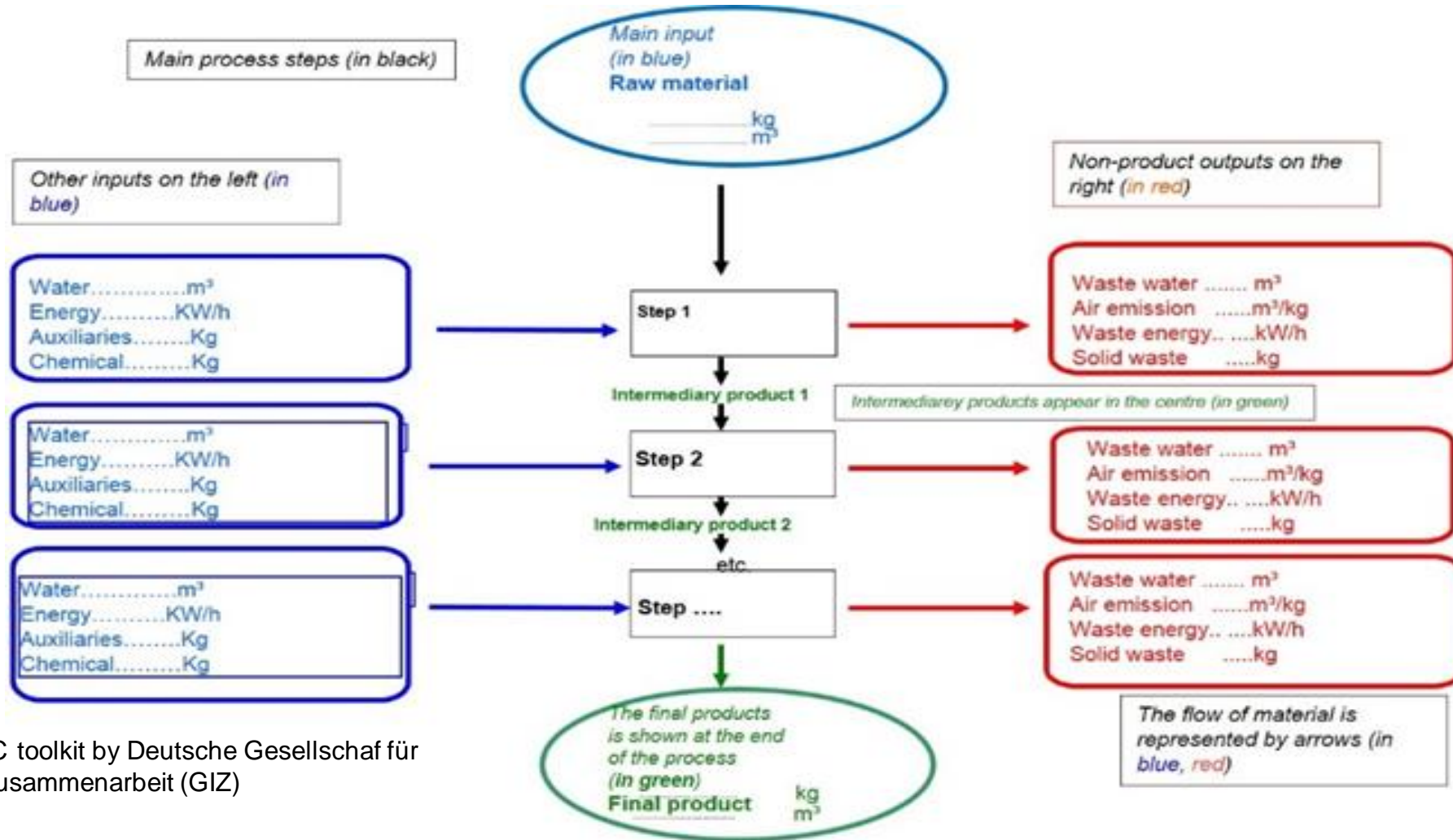
Apply **systematic step-by-step approach** towards understanding process and chemical flows;

Understand **where chemicals and chemical (containing) wastes are present and stored** within your site;

Set boundaries regarding **external operations that your company can/should/wants to influence**. For example,

- Procurement of chemicals and products containing chemicals
- Transport/shipment and delivery of products and chemicals to/from company as
- Disposal of waste products (air emissions, solid waste, wastewater)

Concept of Process Flow Mapping



Source: e-REMC toolkit by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)

Best practices for storage

- Closure of containers
- Condition
- Compatibility
- Size (not larger than 55 Gallons)
- Labelling

The image shows a red-bordered form titled "HAZARDOUS WASTE". It contains the following fields:

- Contents:** A list of six numbered items, each with a line for the name and a percentage sign followed by a line for the amount.
- Hazard(s):** Four checkboxes: Ignitable, Corrosive, Reactive, and Toxic.
- Date Container Full:** A date field with slashes for month, day, and year.
- Bldg — Rm#:** A table with two columns for building and room numbers.

Blue arrows point to the "HAZARDOUS WASTE" title, the first two content lines, the hazard checkboxes, and the date field.

Bldg — Rm#	

Storage of hazardous chemicals



Best practices for storage of hazardous chemicals and waste

- Ensure all containers of hazardous chemicals are properly labeled with the identity of the hazardous chemical(s) and appropriate hazard warnings.
- Segregate all incompatible chemicals for proper storage of chemicals by hazard class. In other words, store like chemicals together and away from other groups of chemicals that might cause reactions if mixed.
- Do not store chemicals alphabetically except within a grouping of compatible chemicals.
- Flammable materials should be stored in an approved, dedicated flammable materials storage cabinet or storage room if the volume exceeds ten gallons. Keep cabinet doors closed.
- Chemicals should be stored no higher than eye level and never on the top shelf of a storage unit. Do not overcrowd shelves. Each shelf should have an anti-roll lip.
- Avoid storing chemicals on the floor (even temporarily) or extending into traffic aisles.

Source: CDC, USA

Best practices for storage of hazardous chemicals and waste

- Liquids should be stored in unbreakable or double-contained packaging, or the storage cabinet should have the capacity to hold the contents if the container breaks.
- Store acids in a dedicated acid cabinet. Store highly toxic or controlled materials in a locked, dedicated poison cabinet.
- Volatile or highly odorous chemical shall be stored in a ventilated cabinet. Chemical fume hoods shall not be used for storage as containers block proper air flow in the hood
- All chemicals should be labeled and dated upon receipt in the lab and on opening. This is especially important for peroxide-forming chemicals such as ethers, dioxane, isopropanol, and tetrahydrofuran.
- Solutions should be labeled and dated when prepared.

Source: CDC, USA

Disposal of Unknowns

- If an unknown chemical is discovered – contact immediately for professional help for identification and analysis
- The chemical must be tested for flammability and toxicity
- Once it is confirmed that the chemical is none of those, it needs to be tested for acidity and alkalinity of the sample
- Finally, it can be disposed after neutralization of the sample
- However, if it is discovered to be flammable or, toxic, professional disposal bodies should be contacted

- Implementation of procedures for handling hazardous materials;
- Procedure and standards for recycling of hazardous materials;
- Conditions for sale or transfer of hazardous materials for recycling;
- Treatment, storage and disposal facilities for hazardous wastes;
- Monitoring packaging labeling and storage of hazardous materials;
- Transportation of hazardous materials and manifest systems;
- Verifying reporting, records and returns;
- Legal liabilities, legal provisions and appeals
- Certified professional support for hazardous waste management service/facilities

Addressing the gaps



- By identifying and updating the rigorous list of hazardous waste that are being imported and generated in Bangladesh,
- Preparing an updated guidelines for making sure of proper management of those waste,
- Handling, recycle, storage or, disposal methods are to be established for each type of waste,
- Inspecting the storage facilities at the factories and ensuring their usability before issuing waste chemical import certificate

Addressing the gaps



- Training of professional in the field of waste management (to provide accredited services to the factories who will need support regarding hazardous waste management),
- Detail Record keeping and maintaining standard safety practices at the industries,
- Making rules easier to understand for implementation.

Exercise: Good Storage Practice

Identify and note down as many chemical related issues as you can

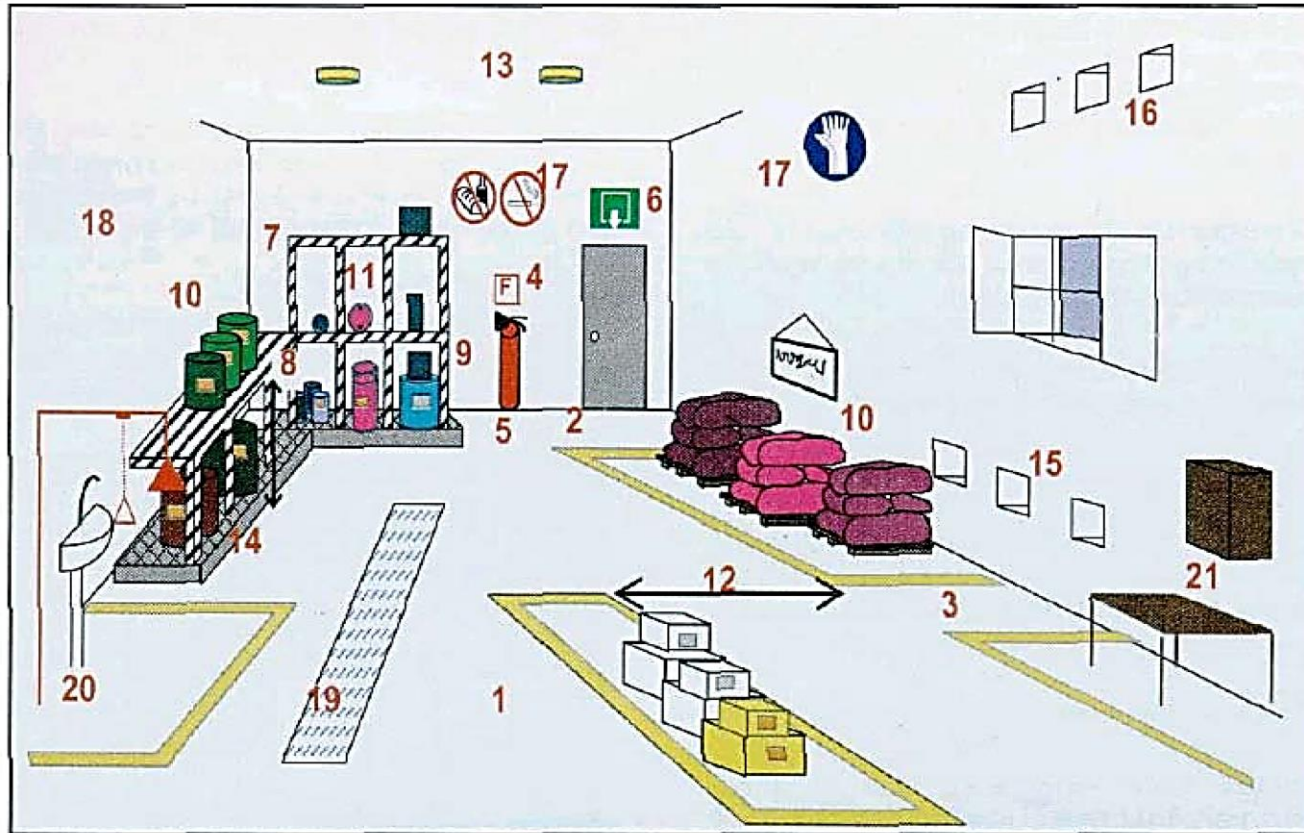
Source: e-REMC materials by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)



Common Causes of Incidents During Storage of Chemicals

- Lack of awareness of the properties of the dangerous substances;
- Operator error, due to lack of training and other human factors;
- Inappropriate storage conditions with respect to the hazards of the substances;
- Inadequate design, installation or maintenance of buildings and equipment;
- Exposure to heat from a nearby fire or other heat source;
- Poor control of ignition sources, including smoking and smoking materials, hotwork, electrical equipment etc; and
- Horseplay, vandalism and arson.

Good Storage Practice



Source: e-REMC materials by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)

1. Flat floor
2. Lockable doors/prohibited entry
3. Clearly designated area for different chemical types
- 4-5. Fire safety
6. Clearly marked emergency exits
9. Secondary confinement for liquid chemicals
10. Proper labeling of containers/area
12. Enough space for trolley/forklift
14. Proper shelving system
- 15-16. Adequate ventilation
17. Available PPE
18. Physically separated from other areas

Separate Incompatible Chemicals

Most common hazard classes include:

- flammables/ combustibles
- corrosive acids
- corrosive bases
- Toxics
- highly toxics
- oxidizers
- compressed gases
- cryogenes
- pyrophorics
- water reactives
- explosives

Caution:

- Place groups of compatible chemicals together.
- Segregate chemicals that are in storage according to compatibility.
- Oxidizers (hydrogen peroxide, nitric acid, perchloric acid, etc.) need to be stored separately from organic chemicals (fuels).
- Particularly dangerous chemicals should be isolated in storage (e.g. hydrofluoric acid, pyrophoric materials, etc.)

Separate Incompatible Chemicals

CLASS		1	2		3	4			5		6	8	
Chemical Segregation By Chemical Group.													
Explosive	1.0 Explosive		Segregate From	Segregate From	Segregate From	Segregate From	Segregate From	Segregate From	Segregate From	Segregate From	Segregate From	Segregate From	Segregate From
Compressed gases	2.1 Flammable	Segregate From		Keep Apart	Segregate From or Keep Apart	Segregate From	Segregate From	Segregate From	Segregate From	ISOLATE	Keep Apart	Keep Apart	
	2.2 Non Toxic Non flammable	Segregate From	Keep Apart		Keep Apart	Segregation may not be necessary	Segregate From	Segregation may not be necessary	Segregation may not be necessary	Segregate From	Segregation may not be necessary	Keep Apart	
	2.3 Toxic	Segregate From	Segregate From or Keep Apart	Keep Apart		Segregate From	Keep Apart	Segregate From	Keep Apart	Segregation may not be necessary	Segregate From	Segregation may not be necessary	Keep Apart
Flammable liquids		Segregate From	Segregate From	Keep Apart	Segregate From		Keep Apart	Segregate From	Segregate From	Segregate From	ISOLATE	Keep Apart	Keep Apart
Flammable solids	4.1 Readily combustible	Segregate From	Segregate From	Segregation may not be necessary	Keep Apart	Keep Apart		Keep Apart	Segregate From	Segregate From	Segregate From	Keep Apart	Segregation may not be necessary
	4.2 Spontaneously combustible	Segregate From	Segregate From	Segregate From	Segregate From	Segregate From	Keep Apart		Keep Apart	Segregate From	ISOLATE	Keep Apart	Keep Apart
	4.3 Dangerous when wet	Segregate From	Segregate From	Segregation may not be necessary	Keep Apart	Segregate From	Segregate From	Keep Apart		Keep Apart	Segregate From	Segregation may not be necessary	Segregation may not be necessary
Oxidising substances	5.1 Oxidising substance	Segregate From	Segregate From	Segregation may not be necessary	Segregation may not be necessary	Segregate From	Segregate From	Segregate From	Keep Apart		Segregate From	Keep Apart	Keep Apart
	5.2 Organic peroxide	Segregate From	ISOLATE	Segregate From	Segregate From	ISOLATE	Segregate From	ISOLATE	Segregate From	Segregate From		Keep Apart	Keep Apart
Toxic		Segregate From	Keep Apart	Segregation may not be necessary	Segregation may not be necessary	Keep Apart	Keep Apart	Keep Apart	Segregation may not be necessary	Keep Apart	Keep Apart		Segregation may not be necessary
Corrosive		Segregate From	Keep Apart	Keep Apart	Keep Apart	Keep Apart	Segregation may not be necessary	Keep Apart	Segregation may not be necessary	Keep Apart	Keep Apart	Segregation may not be necessary	

Source: e-REMC toolkit by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)

Good Storage Practice



Source: e-REMC materials by Deutsche Gesellschaft für
Internationale Zusammenarbeit (GIZ)

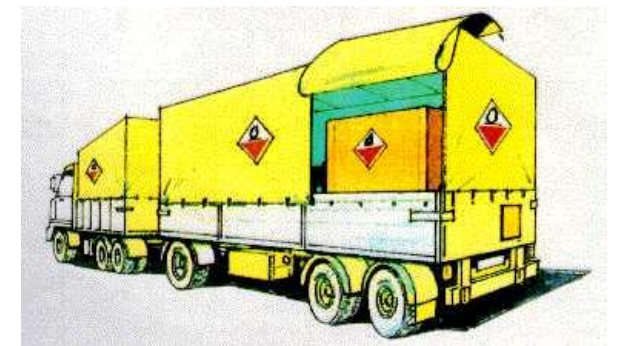
Quick Check on Storage Layout

- Storage layout and siting of stores prepared in advance/available
- Areas for storage and movement assigned, taking into account
 - Chemical segregation requirements and storage classes
 - Maximum storage quantities to be expected
 - Regulatory and supplier recommended chemical storage limits (quantity, type) and arrangements (e.g. divider walls, secondary containments)
 - Special storage requirements (see safety data sheets)
 - Space requirements for safe movement of personnel and fork-lifts
 - Space required for allowing for storage and movements on pallets for easier rearrangement
- Colour floor markings used to clearly demarcate different storage and movement areas

Safe Transport of Chemicals

Procedures and practices on the safe transport of chemicals (and waste):

- Transport of chemicals and chemical waste to/from your company
- Receiving and unloading of chemicals
- Internal transport and conveyance of chemicals and waste (e.g. transport to warehouse, from warehouse to production areas, within production areas,...)



Source: ILO-CIS

Safe Transport of Chemicals

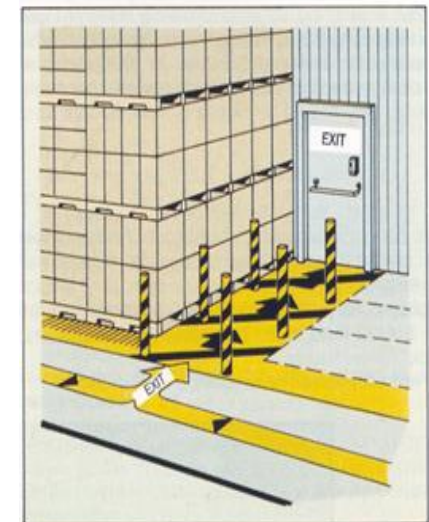
Major aspects of safe transport of chemicals are:

- making and labeling of packages (during transport)
- vehicle requirements (such transport documents, transport, emergency provisions)
- qualification of drivers (e.g. special license, training)
- loading requirements with regard to quantity, mixing with other loads (e.g. compatibility issue)
 - Secure loading of containers and cylinders (protection of valves!)
 - No overloading or avoidance of heavy manual loads

Safe Transport of Chemicals

Internal transport and distribution of chemical containers:

- Secure loading of containers and cylinders (protection of valves!)
- No overloading or avoidance of heavy manual loads
- Smooth and wide enough passage ways to avoid excessive shocks or local stress on containers
- Forklifts to be equipped with a fire extinguisher and an electrically conductive strip for earthing static electricity
- Special training and instructions to operators of transport vehicles (such as speed limits, maximum loads, routes)



Handling of Unused/Expired Chemicals

- Unused and/or expired chemicals can be considered as chemical waste and handle accordingly.
- Store unused/expired chemicals in appropriate containers; plastic bottles are preferred over glass for storing hazardous waste when compatibility is not an issue.
- Segregate unused chemicals by compatibility, and not alphabetically.
- Solid wastes can be incinerated if the facility available.
- Liquid wastes can be neutralized and then treated in ETP.

Handling of Unused/Expired Chemicals

Chemical waste containers must be labeled with the following information:

- Full chemical name and quantity of the waste. For mixtures, each chemical must be listed. Abbreviations, acronyms and ditto marks ("") to replace words are not allowed.
- Date of waste generation;
- Place of origin (department, unit);
- Relevant person's name and telephone number;
- Bottle number assigned on corresponding waste sheet; and

Waste Inventory

- Hazardous substances contained in the waste identified?
- Hazardous properties of those substances known ?
- Threshold concentrations of those substances for making waste hazardous verified?

Example: Color code used in European Waste List

RED: “Absolute Entries” – Hazardous waste regardless of any threshold concentrations (A)

BLUE: “Mirror Entries” – Hazardous waste only if dangerous substances are present above threshold concentrations (M)

BLACK: “Non-hazardous Entries” – Non Hazardous wastes

Waste Inventory: Typical Template

Waste Name	Category / Type	Source Process	Storage Area	Yearly Quantity	Associated Hazards	Disposal Method (actual/recommended)	Waste Disposal Vendor Address	License Number	License Validity Time

Example: European Waste List

Criteria that render wastes hazardous according to European Waste Regulation

Code	Designation	Note
H 1	Explosive	Substances and preparations which may explode under the effect of flame or which are more sensitive to shocks or friction than dinitrobenzene.
H 2	Oxidizing	Substances and preparations which exhibit highly exothermic reactions when in contact with other substances, particularly flammable substances.
H 3A	Highly Flammable	<ul style="list-style-type: none"> • Liquid substances (including extremely flammable liquids) and preparations having a flashpoint of below 21°C, or • Substances and preparations which may become hot and finally catch fire in contact with air at ambient temperature without any application of energy, or • Solid substances and preparations which may readily catch fire after brief contact with a source of ignition and which continue to burn or to be consumed after removal of the source of ignition, or • Gaseous substances and preparations which are flammable in air at normal pressure, or • Substances and preparations which, in contact with water or damp air, evolve highly flammable gases in dangerous quantities.
H 3B	Flammable	Liquid substances and preparations having a flashpoint equal to or greater than 21°C and less than or equal to 55°C.
H 4	Irritant	Non-corrosive substances and preparations which, through immediate, prolonged or repeated contact with the skin or mucous membrane, can cause inflammation.
H 5	Harmful	Substances and preparations which, if they are inhaled or ingested or if they penetrate the skin, may involve limited health risks.
H 6	Toxic	Substances and preparations (including very toxic substances and preparations) which, if they are inhaled or ingested or if they penetrate the skin, may involve serious, acute or chronic health risks and even death.
H 7	Carcinogenic	Substances and preparations which, if they are inhaled or ingested or if they penetrate the skin, may induce cancer or increase its incidence.
H 8	Corrosive	Substances and preparations which may destroy living tissue on contact.
H 9	Infectious	Substances containing viable micro-organisms or their toxins which are known or reliably believed to cause disease in man or other living organisms.
H 10	Toxic for reproduction	Substances and preparations which, if they are inhaled or ingested or if they penetrate the skin, may produce or increase the incidence of non-heritable adverse effects in the progeny and/or of male or female reproductive functions or capacity.
H 11	Mutagenic	Substances and preparations which, if they are inhaled or ingested or if they penetrate the skin, may induce hereditary genetic defects or increase their incidence.
H 12	-	Substances and preparations which release toxic or very toxic gases in contact with water, air or an acid.
H 13	Sensitizing	Substances and preparations which, if they are inhaled or if they penetrate the skin, are capable of eliciting a reaction of hyper-sensitization such that on further exposure to the substance or preparation, characteristic adverse effects are produced.
H 14	Ecotoxic	Substances and preparations which present or may present immediate or delayed risks for one or more sectors of the environment.
H 15	-	Substances and preparations capable by any means, after disposal, of yielding another substance, e.g. a leachate, which possesses any of the characteristics listed above.

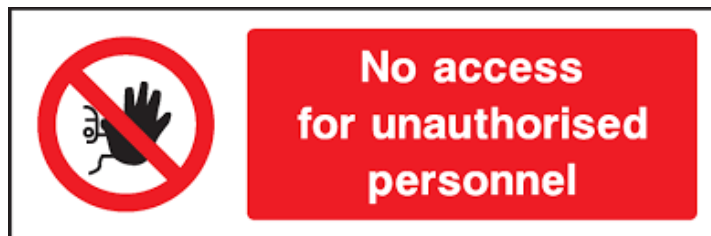
Example: Textile Industry

EWL Code	European waste list (EWL) Classification	H	H	Y
		(EU)	(Basel)	(Basel)
04 02	Wastes from the textile industry			
04 02 09	Wastes from composite Mats (impregnated textile, elastomer, plastomer)			
04 02 10	Organic matter from natural products (for example grease, wax)			
04 02 14*	Wastes from finishing containing organic solvents	H3, H5	H3, H4.1	Y42
04 02 15	Wastes from finishing other than those mentioned in 04 02 14			
04 02 16*	Dyestuffs and pigments containing dangerous substances	H7, H3, H5, H8	H3, H11, H4.1	Y12
04 02 17	Dyestuffs and pigments other than those mentioned in 04 02 16			
04 02 19	Sludges from on-site effluent treatment containing dangerous substances	H4, H7, H10, H6	(H11, H6.1)	Art. 1 (1) b
04 02 20	Sludges from on-site effluent treatment other than those mentioned in 04 02 19			
04 02 21	Wastes from unprocessed textile fibres			
04 02 22	Wastes from processed textile fibres			
04 02 99	Wastes not otherwise mentioned			

Example: Leather Industry

EWL Code	European waste list (EWL) Classification	H	H	Y
		(EU)	(Basel)	(Basel)
04 01	Wastes from the leather and fur industry			
04 01 01	Fleshings and lime split wastes			
04 01 02	Liming Waste			
04 01 03*	Degreasing wastes containing solvents without a liquid phase	H3, H6, H7	H4.1, H6.1, H11	Y6, Y9, Y42
04 01 04	Tanning liquor containing chromium			
04 01 05	Tanning liquor free of chromium			
04 01 06	Sludges, in particular from on-site effluent treatment containing chromium			
04 01 07	Sludges, in particular from on-site treatment free of chromium			
04 01 08	Waste tanned leather (blue sheetings, shavings, cuttings, buffing dust) containing chromium			
04 01 09	Wastes from dressing and finishing			
04 01 99	Wastes not otherwise specified			

Hazardous Waste Storage Area



- large enough to hold quantities of hazardous waste generated between the usual pick-up dates or further scheduled times of disposal for the hazardous waste
- separately store different types of hazardous waste
- protected from sun and rain => Excessive heat might trigger a fire or explosion, while rain water might mix with residue of leaked chemical wastes and effuse/flow out, contaminating soil and groundwater
- provisions to contain any leakage or spillage => floor made of impermeable material or plastic sheets or lined with sheets as well as having provisions for containment / dyking

Hazardous Waste Storage Area: Checklist

- Is all hazardous waste collected and move to a specifically designated storage area in your company?
- Is this storage area properly isolated from its surrounding as well as protected from exposure to sun and rain?
- Is this hazardous waste storage area clearly marked and access limited?
- Is the capacity of the area sufficient for the quantities of hazardous wastes generated and stored in your company?
- Are incompatible as well as liquid and solid hazardous wastes stored separately from each other?
- Is there an established hazardous waste collection schedule that ensure hazardous waste is not stored on-site for excessive periods of time?
- Is the hazardous waste storage area equipped with emergency equipment (such as suitable fire extinguishers, spill collection material/equipment)?

- Does the hazardous waste storage have provisions to contain leaks to soil and ground water (e.g. dyking, plastic lining)?
- Is ventilation provided to keep humidity, temperature and concentration of, dust, vapors and fumes at a low level in the storage area?
- Are the storage containers compatible with the hazardous waste they contain (e.g. corrosion resistant)? Are all containers in good condition?
- Are containers kept closed at all times?
- Are the containers properly labelled allowing easy identification of content and hazards?
- Are containers inspected regularly for leaks and other defects?
- Are containers with leaks or defects immediately replaced?

Hazardous Waste Handling: Checklist

Organization

- ▶ Is a designated person in charge of the hazardous storage area?
- ▶ Is a hazardous waste storage register (inventory) maintained and kept up-date?
- ▶ Are there specific working procedures and instructions for safe handling of hazardous waste and emergency measures?
- ▶ Have the workers, who are engaged in collecting and handling the hazardous waste, been instructed and trained on safe working and emergency procedures?
- ▶ Is suitable personal protective equipment available, which is specific to the type hazardous waste handled?
- ▶ Do the workers use designated personal protective equipment?

Transport

- ▶ Is the capacity of the transport vehicles adequate to the quantity of hazardous waste transported?
- ▶ Are the transport vehicles equipped with the necessary safety equipment (such as fire extinguishers, protective clothing, spill collection material/ equipment, etc.)?
- ▶ Are the transport vehicles clearly and adequately marked when transporting hazardous waste?
- ▶ Are the transport vehicles well maintained and clean (brakes, lights, tyres)?
- ▶ Are the driver (and assistant) specifically trained and instructed in safety and emergency procedures?
- ▶ Is the routing for hazardous waste transportation specified?

Typical Quick Questions for Inspection

- Does the facility have an up-to-date chemical inventory?
- Does the facility record quantities of chemical products used for each work order/production order?
- Does the facility regularly identify the quantity of chemicals lost due to accidents (e.g., spillages, poor labelling, accidental mixtures)?
- Does the facility have a document retention procedure that requires retention of key chemical inventory records for at least one year?
- Does your facility have a documented inventory of chemicals purchased (including your supplier's manufacturing locations), stored (including their location) and used at your facility?

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