

## Guidance note

### Chemical Substances; import, export, using, handling and storage @ Sohar Industrial Port and Sohar Free Zone.

REP-115-10-DJ  
January 2011

#### Definitions:

<i>Chemical substances:</i>	Substances with a CAS number
<i>CAS:</i>	Chemical Abstracts Service
<i>NOL:</i>	No Objection Letter
<i>LNJ</i>	Letter of No Jurisdiction
<i>MSDS:</i>	Material Safety Data Sheet
<i>UN number</i>	A number that identifies a hazardous substance
<i>Controlled substances</i>	Substances that are on controlled lists and require chemical permit
<i>SIP</i>	Sohar Industrial Port
<i>SFZ</i>	Sohar Free Zone
<i>ARWA</i>	Advanced Regulatory Wiki Application, the compilation of regulatory documents by the SEU.
<i>EHS</i>	Extremely Hazardous Substances

Chemicals are produced and used as raw materials and process aids in various companies in the SIP and SFZ. Chemicals are hardly ever pure substances and are mostly mixtures. The components in the mixture or the mixture itself has a CAS number (refer to <http://www.cas.org/expertise/cascontent/index.html>).

Substances can be categorized as:

- non-hazardous,
- hazardous and
- extremely hazardous.

A substance will get a UN number when it is considered as hazardous. A substance is extremely hazardous as listed in the US EPA regulation.

Regulating chemical substances serves various purposes like control for control global climate change, control chemical warfare agents, reducing risk of exposure to hazardous substances and safe storage and handling of chemical substances

## Legal Framework

- MD 25/2009 concerning the Regulations for Organisation of Handling and Use of Chemicals
- ROP Civil Defense requirements for storage and transport.



## Permits

### Chemical Permit basis

A *Chemical Permit* is required for substances that are imported, exported, traded, handled, processed or stored and have a UN number or are otherwise controlled substances.

The Permit Owner is the SIP or SFZ company that provides any one of the above listed services.

SEU considers in principle only SIP and SFZ companies as permit holders as the chemical handling and storage is covered by the Environmental Management Plan and company procedures of the particular SIP or SFZ company.

*Note that till now the hydrocarbon fuels were exempted from a Chemical Permit, however from now on a chemical permit is required for all hazardous and controlled substances.*

The *Chemical Permit* is issued by the MECA Chemical Department; applications for SIP and SFZ companies need to be submitted to the SEU.

Permit applications for multiple substances can be combined in one application form for chemicals that are local purchase. Permit applications for imported chemicals require an application form for every chemical substance.

## Controlled substances

Substances that are listed in one the categories below, require a chemical permit and might be subject to additional requirements.

### Substances listed in MD 25/2009

#### Hazardous Chemicals

Refer to the UN number system [http://en.wikipedia.org/wiki/List\\_of\\_UN\\_numbers](http://en.wikipedia.org/wiki/List_of_UN_numbers) or the iphone app 'Un Number' and other internet sources.

#### Chemical Precursors

Table 2 Chemical Precursors

Substance	CAS	Substance	CAS	Substance	CAS
Acetic anhydride	108-24-7	Ergometrine	113-15-5	piperidine	110-89-5
N- Acetylanthranilic acid	89-52-1	Norephedrine		Pseudo ephedrine	90-82-4
Potassium permanganate	7722-64-7	Phenyl propanone	103-79-7	Safrole	94-59-7
Ephedrine	299-42-3	Alpeleronal	120-57-0	Acetone	67-64-1
Ergometrine	60-79-7	Hydrochloric acid	7647-01-0	phenylacetic acid	103-82-2
Anthranilic acid	118-92-3	Methylethyl ketone	78-93-3	Toluene	108-88-3
Ethylether	60-29-7	Sulphuric acid	7664-93-9		

## Pesticides



Refer to the Rotterdam Convention Annex III list and the principle of PIC (Prior Informed Consent) <http://www.pic.int>

### Ozone Depleting Substances (ODP's)

Refer to the Montreal Protocol <http://www.undp.org/chemicals/montrealprotocol.htm>.

### Extremely Hazardous Substances (EHS)

EHS Substances are defined by the US EPA (<http://www.epa.gov/ceppo/pubs/title3.pdf>). The US EPA regulation uses a threshold value for regulating the EHS.

Examples of the common Extremely Hazardous Chemicals:

Acrylonitrile	Liquefied petroleum gas (LPG)
Ammonia (anhydrous)	Methacrylonitrile
Ammonia	Nitric acid
Chlorine	Nitric acid (conc 80% or greater)
Diphenylmethane diisocyanate (MDI)	Nitrogen dioxide
Formaldehyde	Nitrogen oxide (NO)
Formaldehyde (solution)	Ozone
Hydrazine	Phenol
Hydrofluoric acid (conc. 50% or greater)	Sulfur dioxide
Hydrogen chloride (gas only)	Sulfuric acid
Hydrogen fluoride	Styrene
Hydrogen peroxide (conc.>52%)	Toluene diisocyanate (TDI)
Hydrogen sulfide	Vinyl acetate
Hydroquinone	Vinyl acetate monomer

For the full list please check: <http://www.epa.gov/ceppo/pubs/title3.pdf>

## Chemical Permit Conditions

The issued Chemical Permit contains a number of generic conditions. In some cases the SEU will include additional conditions as required by the chemical substance involved, this will mostly in the case of the extremely hazardous substances (EHS).

In these special conditions, requirements for handling and storage will be mined from international available documentation referred to in the IPPC documentation or sectorial organizations like CEFIC.

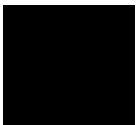
Under all circumstances MECA/SEU assumes that chemicals are handled with full awareness of the hazardous properties and that all 'good practices' are adhered to.

Companies might be requested to submit to the SEU a list of type and quantity of controlled chemical substances that are on-site handled or stored.

## Chemical Storage permit conditions

The storage of chemicals requires a permit of ROP Civil Defense. The conditions cover transport and storage. The storage requirements are aimed at the prevention of exposure to humans, to safe handling and prevention of chemical reactions.

The requirements will be included in ARWA.



## Chemical Storage Best Practices

### Basic requirements for storage of chemical substances

#### Construction

- Constructed of fire resistant material with a minimum fire resistance of two hours.
- Separation with fire resistance of at least two hours from any building or room which may be affected by the materials being stored.
- Double containment of plus 10 percent of that quantity, can be contained.
- Suitable shelving, if necessary, constructed of non-porous and non-combustible material.
- Properly ventilation

#### Facilities and equipment

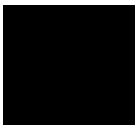
- Clear labeling of storage cells and packaging.
- Presence of personal protective equipment.
- Eye wash and emergency shower facility.
- Equipped with fire extinguishers with suitable quantity and type (near escape route).
- Smoke detection.
- Communication system to the main office or emergency system.
- Spill control and clean-up materials.

#### Operational

- All chemicals must be stored according to the [Chemical Storage Incompatibility Guidelines](#). Note that the guidelines are not exhaustive.
- Spilled chemicals must be cleaned up directly and broken packaging or containment must be repaired.
- Chemical inventory must be available at all times for emergency response purposes.
- Proper labeling of storage cells and shelves as well as packaging is required.
- 'Good practices' must be used by trained staff.

### How to store chemicals:

- Store all chemicals by their hazard class and not in alphabetical order. Chemical Storage Segregation Guidelines in this chapter.
- Storing chemicals by compatibility means for example that oxidizers should be separated from organics, air/water reactives must be kept dry and inorganic cyanides should be stored away from acids.
- Volatile toxic substances should be stored in ventilated storage cabinets. When volatiles must be stored in a cooled atmosphere, explosion-proof refrigerators or cold rooms designed for this purpose must be used.
- Toxic substances must be segregated in a well-identified area with local exhaust ventilation.
- Chemicals that are highly toxic or other chemicals whose containers have been opened must be in unbreakable secondary containers. For example, place containers of concentrated acids or bases into plastic tubs to help contain any leakage.
- Do not store chemicals near heat sources such as ovens or steam pipes. Also, do not store chemicals in direct sunlight.
- Containers must be kept closed at all times.



- Liquid and solid materials are to be stored separately where possible, to avoid contamination in case of a spillage.
- Do not store any chemicals in glass containers on the floor.
- Inspect your chemicals routinely for any signs of deterioration and for the integrity of the label.

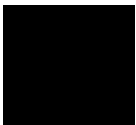
## Be safety conscious:

- Storerooms must have adequate security. Unauthorized entry to the store is prohibited. Only scientists and technicians from the Group are allowed in the chemical store.
- Relevant safety information on chemicals is to be available via the Hazardous Substances Controller or the Safety Representative. MSDS's must be kept in a filing cabinet in the store.
- Consult your Hazardous Substances Controller for the disposal of any old, outdated, or unused chemicals.
- Smoking, eating or drinking in the store or during handling of chemical substances are prohibited. Appropriate decontamination procedures, such as washing hands with soap and water after handling chemicals in the store, must be followed.
- Wear the prescribed personal protective equipment for the chemical substance to be handled. Clothing rules and all the personal protection measures and rules (regarding lab coats, safety goggles, gloves, etc) that apply to laboratory workers, also apply to people entering the chemical store room.
- When decanting liquid chemicals into measures or other containers, care must be taken to prevent spillage.
- When transferring solid chemicals to other containers, care must be taken to prevent dust formation and spillage.
- Spillages are to be cleaned up immediately.
- All water used for washing equipment should be collected as chemical waste material.
- All waste materials must be put in the dedicated waste containers and only be removed or destroyed according to instructions. (See section on chemical waste.)
- Empty containers are not to be disposed of with other waste. To prevent re-use for unauthorized applications they need to be removed with other chemical waste, according to the chemical waste disposal guidelines.
- Know the location of the master control shut-off valves for gas, water and electricity.
- Stored chemicals should be examined periodically (at least annually) for replacement, deterioration, and container integrity and with a view to minimization.

## Conducting an annual inventory

The Chemical Store Supervisor will perform or initiate and supervise an annual stock taking survey to update his inventory. The aims are:

- To check for ethers and other chemicals with limited shelf life.
- To remove surplus hazardous chemicals.
- To remove chemicals that will not or have not been used in the past 1-3 years.
- To correct incompatible storage.
- To identify which chemicals are present.
- To conduct a regular clean-up of containers and shelving.



## Signs and Labels

Prominent signs and labels of the following types should be used:

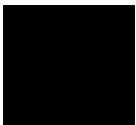
- Laboratory Inventory posters, including emergency contacts, must be posted outside each work area;
- Emergency Instruction signs must be prominently posted;
- Identity labels, showing contents of containers and associated hazards. Labels on all incoming chemical containers cannot be removed or defaced (unless the container is empty and ready for disposal). All secondary containers must be labeled with at least the identity of the contents, health hazards (including target organs), and manufacturer name. Waste Disposal Labels/Tags must be used to identify a waste container as "waste".
- Location signs for safety equipment, first aid equipment, and exits;
- Warning signs at areas or equipment where special or unusual hazards exist;
- Areas where food and beverage consumption and storage are not permitted.

## Records

- Maintaining current records of hazardous chemicals assists in implementing proper storage and safety procedures and is necessary for emergency response pre-planning. It is the Hazardous Substances Controller's responsibility to keep an updated hazardous chemical inventory poster on file and to post a current inventory summary sign outside the lab entrance. Lab personnel should also keep usage records of high-risk substances.
- Material Safety Data Sheets (MSDS) provide information on hazardous chemicals and must be readily available for all hazardous chemicals in the lab
- Any lab accident must be reported to the competent department or management.

## Chemical Storage Incompatibility Guidelines

- The competent Chemical Substances Controller will implement and regularly check if the guidelines are followed.
- Examples of compatibility problems arising from storing chemicals alphabetically include:
  - Alkanes and Ammonium Nitrate
  - Hydrogen Peroxide and Hydrazine
  - Ammonia and Bromine
  - Nitric Acid and Phenol
  - Aldehydes and Amines
  - Sodium Cyanide and Sulfuric Acid
- Calcium Hypochlorite and Carbon
- Even apparently safe storage can be a potential problem. The following materials are often stored together even though there are hazards should the materials mix:
  - Acetic Acid and Nitric Acid
  - Perchloric Acid and Sulfuric Acid
  - Concentrated Acids and Bases
- Separate by Compatibility refer to:
  - Material Safety Data Sheets



- Chemical Catalogues

## Guidelines for storage of acids and bases:

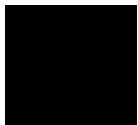
- store acids and bases separately
- store acids in dedicated acid cabinet
- store oxidizing acids (e.g. nitric acid) away from organic acids (e.g. acetic acid)
- store hydrofluoric and perchloric acids in secondary containers manufactured from compatible materials
- safety showers and eye wash facilities must be within easy access
- protective equipment must be inspected regularly to insure proper working order, especially in corrosive atmospheres
  - storage or dispensing facility.
- due to flammable vapors.

## Storage of Compressed Gas Cylinders

- protect against mechanical damage
- store in a secure area
- store with protective caps on
- store in a dry, well-ventilated area
- store flammable, oxidizing and poison gases separately
- if stored indoors, the room must have a 2-hour fire separation with entry from the exterior
- natural ventilation to outside wall must exist; room must have no other purpose
- poisonous compressed gases shall be separated from remainder of building by a gas tight fire separation.
- poisonous compressed gases shall be stored in a room with an exterior entrance and not with combustible or flammable material.

## Flammable Liquid Storage Rooms

- A properly designed flammable liquid storage room must satisfy many requirements, e.g. location, ventilation, electrical equipment, fire protection, etc. It must also meet the needs of the user, e.g. adequate size, conveniently located, etc.
- The flammable liquids room should be easily accessible to fire fighting. From a fire safety standpoint, rooms located in corners of buildings meet this requirement; e.g. window openings and doors all providing sufficient entry; also, explosion venting can be incorporated into the exterior walls. From a management point of view, such a location is advantageous in that incoming shipments of flammables can be handled without having to transport them through the main work area.
- There are specific guidelines for flammable liquid storage rooms. The maximum number of liters per square meter of floor space; maximum room size with and without a sprinkler system (or other automatic extinguishing system); fire resistance rating of the interior walls. Other additional requirements include: a raised liquid-tight sill of at least 102 mm in height (a sunken floor or open grated trench is also permissible); floor drains which drain to a safe location; self-closing, listed, one and one-half hour Class B fire door (listed 3-hour Class A may be required for walls with a rating greater than 2 hours).
- Rooms containing Class I flammables must have electrical equipment suitable for Class I, division 2; for Class II and Class III liquids, electrical fixtures must be approved for general use. The room must



also have a gravity or mechanical exhaust ventilation system (ICFM/sq.ft. of floor area) equipped with suitable interlocks.

## Guidelines for storage of Oxidizing Materials:

- Oxidizing materials must be stored away from flammable and combustible materials as well as separate from reducing agents.
- The simplest method of ensuring that this occurs is to locate all oxidizing materials and store them in a separate location.
- Read material safety data sheets to ensure that they are all compatible with each other.

## Guidelines for storage of Dangerously Reactive Materials:

- Read MSDS. Isolate from other chemicals and ensure that storage conditions are appropriate. Cool, dry well-ventilated areas are required. Additional criteria may include an oxygen free environment for water reactive materials.
- Once the chemicals are sorted into the previously described groupings, they can then be sorted into organic and inorganic classes.. The compatible families suggested are:

### Inorganic

- Metals, hydrides
- Halides, sulfates, sulfites, thiosulfates
- Amides, nitrates\*\* (except ammonium nitrate), nitrites\*\*, azides\*\*, nitric acid
- Ethers\*\*, ketones, ketenes, halogenated carbon
- Sulfides, selenides, phosphides, carbides, nitrides
- Chlorates, perchlorates\*\*, perchloric acid\*\*, chlorites, hypochlorites, peroxides\*\*, hydrogen peroxide
- Arsenates, cyanides, cyanates
- Borates, chromates, manganates, permanganates
- Acids (except nitric)
- Sulfur, phosphorus\*\*, arsenic, phosphorus pentoxide\*\*

### Organic

- Acids, anhydrides, peracids
- Alcohols, glycols, amines, amides, imines, phosphates, halogens, imides
- Hydrocarbons, esters, aldehydes
- Hydroxides, oxides, silicates, carbonates, hydrocarbons, ethylene oxide
- Epoxy compounds, isocyanates
- Peroxides, hydroperoxides, azides\*\*
- Sulfides, polysulfides, sulfoxides, nitriles
- Phenols, cresols

\*\* potentially unstable