

CODE OF PRACTICE ON THE PACKAGING, LABELLING AND STORAGE OF CHEMICAL WASTES

(Published under the Waste Disposal Ordinance (Cap.354) Section 35)



**Environmental Protection Department
Hong Kong**

PREFACE

This Code of Practice is a statutory document. It was first published in October 1992 by the Secretary for Planning, Environment and Lands after consultation with the Environmental Pollution Advisory Committee. The purpose of this Code is to provide guidance for complying with the requirements of the Waste Disposal (Chemical Waste)(General) Regulation on the packaging, labelling and storage of chemical waste. Due to the inherent hazardous nature of chemical waste, it is important to pay special care in the handling and storage of these wastes so as to minimise any danger to health or risk of pollution to the environment.

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CONTENTS

	Page		Page
1. INTRODUCTION	4	APPENDICES	
2. PACKAGING		Appendix A List of Risk Phrases for Labelling	17
2.1 General Requirements	4	Appendix B List of Safety Phrases for Labelling	18
2.2 Specification of Containers	5	Appendix C Hazardous Waste Compatibility Chart	20
2.3 Recommended Types of Containers	6	Appendix D Contact address and telephone numbers of Fire Protection Bureau	22
3. LABELLING		Appendix E List of safety information on chemical handling published by the Labour Department	23
3.1 General Requirements	8	Appendix F List of safety equipment for safe handling of chemical waste	24
3.2 Particulars on the Label	8	Appendix G General guidance for handling chemical waste spillage/ leakage at industrial premises	25
3.3 Dimensions of Labels	11		
4. STORAGE			
4.1 Provision of Storage Area	11		
4.2 General Requirements	11		
4.3 Alternative Arrangement for Small Waste Producers	14		
4.4 Temporary Storage at Working Area	14		
4.5 Containers with Residues	14		
4.6 Storage of Chemical Waste Classified as Dangerous Goods	15		
5. SAFETY PROCEDURES			
5.1 General Requirements	15		
5.2 Warning Signs at the Storage Area	15		
5.3 Safety Training and Equipment	15		
5.4 Emergency Procedures	16		
6. EXEMPTION	16		

1. INTRODUCTION

■ The Waste Disposal (Chemical Waste) (General) Regulation (the Regulation) has been introduced under the Waste Disposal Ordinance (Cap.354) to control the handling, collection, treatment and disposal of chemical waste. The Regulation defines **chemical waste** as any substance or thing being scrap material, effluent, or an unwanted substance or by-product arising from the application of or in the course of any process or trade activity, and which is or contains any substance or chemical specified in the prescribed schedule if such substance or chemical occurs in such form, quantity or concentration so as to cause pollution, constitute a danger to health or risk of pollution to the environment.

■ The Regulation requires waste producers to arrange proper packaging, labelling and storage of chemical waste before they are transported off-site to disposal facilities, in order to safeguard the health and safety of workers and the general public and to minimise potential hazards arising from improper handling of chemical waste. These requirements apply also to temporary storage of chemical waste prior to on-site or in-house treatment. This Code of Practice (COP) provides guidance for waste producers on how to comply with the regulatory requirements.

■ Certain chemical wastes are also classifiable as Dangerous Goods (DG) under the Dangerous Goods Ordinance, Cap.295 (DGO). The Dangerous Goods (General) Regulations set out specific requirements for the labelling, packaging, storage and conveyance of DG. Under Section 6 of the DGO, any person who wishes to manufacture, store, convey or use DG in excess of the exempted quantity prescribed in the DGO should also apply for a licence from the Director of Fire Services. Any chemical waste classified as a DG will also be subject to the requirements of the DGO.

2. PACKAGING

2.1 General Requirements

Standard of containers

■ Chemical waste should be packed and held in containers of suitable design and construction so as to prevent leakage, spillage or escape of the contents under normal conditions of handling, storage and transport (see Section 2.2).

Containers to be resistant to the contents

■ All parts of the container (including closures) in direct contact with chemical waste must be resistant to any chemical or other action of such waste. The materials of the containers must not be liable to any reaction with the contents so as to form any dangerous product or weaken the container. Where necessary, a container and its closure should be protected by an inner lining, coating or treatment to render it compatible with the chemical waste being stored. Materials, which can be significantly softened or rendered brittle or permeable because of chemical action of the contents, or temperature changes likely to be experienced during storage or transport, should not be used. It is the responsibility of waste producers to ensure that the containers are compatible with the chemical waste to be packed.

Containers should be in good condition

■ Any container used should be in good condition and free from corrosion, contamination, damage or any other defects which may impair the performance of the container. A waste producer should carry out visual inspection of both the outside and inside of the container to determine its condition before a container is used or re-used for packing chemical waste. If there is doubt on the integrity of the container, it should not be used.

Containers to be securely closed

■ Every container of chemical waste should be securely closed or sealed, correctly placed and kept clean. No chemical waste should adhere to the external surface of the container. The closure device should be so designed that it is unlikely that it can be incorrectly or incompletely closed, and also that it can be checked easily to determine that it is completely closed.

No mixing of incompatible wastes in a container

■ There must not be any mixing of different types or sources of chemical wastes in the same container where such mixing is likely to produce dangerous consequences. In general, separate containers should be used for packing different types of waste or waste arising from different sources and processes. This will minimise the danger of mixing incompatible wastes, simplify the labelling of containers and avoid complications during subsequent waste treatment.

Sufficient air space in containers when storing liquid wastes

■ When packing a container with liquid chemical waste, sufficient ullage (air space) should be allowed to ensure that neither leakage nor permanent distortion of the container occurs as a result of liquid expansion caused by changes in temperature or other physical conditions which are likely to occur under normal conditions of handling, storage and transport. Generally 100 mm air space should be allowed between the top of the container and the level of the liquid contents.

2.2 Specification of Containers

■ In general, the design, material and construction of containers should follow the specifications set out in Chapter 9 of the United Nations Recommendations on the Transport of Dangerous Goods, UN Document ST/SG/AC.10/1/Rev.6 (the "UN Orange Book"). Adoption of the UN Specifications for the packaging of chemical waste will ensure consistency and compatibility with international safety standards for the packaging and transport of chemicals and DG.

■ For each container, the specific requirements to be met include-

- Design and construction criteria as set out in section 9.6 of the UN Specifications.
- Performance test requirements as set out in section 9.7 of the UN Specifications. The tests include
 - Drop test
 - Leakproofness test
 - Internal pressure (hydraulic) test
 - Stacking test

The standards to be adopted for such tests should be those applied to substances under Packing Group II of the UN Classification.

- Provision of a durable and legible marking to indicate that its design and manufacture conforms to the UN Specifications. The marking should consist of the UN packaging symbol and other information specified by the UN Coding system. The requirements are summarized in Table 1. For details, the **Dangerous Goods Regulations, International Air Transport Association (IATA Resolution 618, Attachment "A") (latest edition)** should be consulted.

Information Required	Symbol/Unit
- Code number for the design type	3 - Character Code
- Packing Group(PG)	X, Y or Z
- Relative density (for liquids) or Gross mass (for solids)	- Kg
- Maximum test pressure (for liquids)	kPa
- Year of manufacture	-
- Country/State where test done	-
- Name or identification of manufacturer	-

Table 1 Marking Requirements of Containers under the UN Coding System

■ The use of any container with a capacity exceeding 450 litres is subject to the approval of the Environmental Protection Department (EPD). In general, suppliers or manufacturers of such containers can seek prior general approval from EPD in respect of each design type or model. In other situations, e.g. use of a custom-made container, an application should be made to EPD in writing together with information on the design and specifications of the specific container.

■ For the purpose of this Code, containers which are designed and constructed in accordance with any of the following specifications would be deemed to satisfy the UN Specifications and may be used for chemical waste packaging-

- International Maritime Dangerous Goods Code (IMDG Code)
- Dangerous Goods Regulations, International Air Transport Association (IATA Resolution 618, Attachment "A") (latest edition)
- United States Department of Transportation's Code of Federal Regulations Title 49 Part 178 (49 CFR 178)
- Australian Code for the Transport of Dangerous Goods by Road and Rail
- European Code of Transport of Dangerous Goods by Road (ADR)
- European Code of Transport of Dangerous Goods by Rail (RID)

■ Waste producers should ensure that any container to be used complies with the above specifications. Generally, a waste producer should check the existence of an appropriate marking and the information it contains. If there is doubt on the container specifications, the waste producer should request the supplier or manufacturer of the container to furnish test certificate/report for the container. Such information should be kept as evidence of compliance with the requirements of this Code.

2.3 Recommended Types of Containers

■ Although it is acceptable to use any container which complies with the requirements set out in sections 2.1 and 2.2, for chemical waste classifiable as DG under the DGO, their packaging should also follow the requirements under the DGO and its subsidiary legislation. In general, it is desirable to adopt a few common types in order to facilitate handling and transport by all parties concerned. The recommended types, including the size and materials of construction, are set out below-

Types of containers

■ Drums and jerricans are the preferred types as they are commonly available and suitable for a wide range of wastes. There are generally two configurations, removable head (open head) for solids and sludges and non-removable head (tight head) with opening not exceeding 70 mm in diameter for filling liquids. See Table 2 for the common types and sizes.

Type & Configuration	Common Sizes
Drums	
- removable & non-removable head	20- 60 litres
	210-230 litres
Jerricans	
- removable & non-removable head	20- 25 litres

Table 2 Common Types and Sizes of Containers

■ For wastes in solid and bulky form, e.g. asbestos sheets and polychlorinated biphenyl (PCB) contaminated equipment, heavy duty and leak-proof plastic bags which are made to the specifications in section 2.2 of this code could be used (see also the Code of Practice on the Handling, Transport and Disposal of Asbestos Waste and the Code of Practice on the Handling, Transport and Disposal of PCB Waste).

Size of containers

■ Consideration should be given on the quantity and frequency of chemical waste arisings in determining the size of containers to be used. Space and access within the premises should also be considered if large size containers have to be moved between the production and storage areas. As an example, if the quantity of a waste is less than 100 litres per batch, it may be more appropriate to use a number of smaller containers.

Materials of the containers

■ Plastics and steel are the most common types of materials. It is important to ensure that the materials used for container body, closures and fittings are compatible with the contents to be stored. If they are not, suitable internal lining, protective coating or treatment should be applied. A general indication of the chemical compatibility of common containers for the major chemical waste types is given in Table 3.

Chemical Waste Type	Material of Containers or Inner Liner								
	Plastic				Steel				
	HDPE	PP	PVC	Teflon	Mild/ Carbon Steel	Stainless Steel			
						(304)	(316)	(440)	
Acid (Non-oxidizing) e.g. Boric acid, Hydrochloric acid	R	R	A	R	N	*	*	*	
Acid (Oxidizing) e.g. Nitric acid	R	N	N	R	N	R	R	*	
Alkali	R	R	A	R	N	R	*	R	
Chromium or Non-chromium Oxidizing Agent	R	A*	A*	R	N	A	A	*	
Cyanide Waste	R	R	R	(A-N)*	N	N	N	N	
Halogenated or Non-halogenated Solvent	*	N	N	*	A*	A	A	A	
Lubricating Oil	R	A*	A*	R	R	R	R	R	
Metal Salt Solution	R	A*	A*	R	A*	A*	A*	A*	
Metal Sludge	R	R	R	R	R	*	R	*	
Mixed Organic Compound	R	N	N	A	R	R	R	R	
Oily Waste	R	N	N	R	A*	R	R	R	
Organic Sludge	R	N	N	R	R	*	R	*	
Paint Waste (solvent base)	R	N	N	R	R	R	R	R	
Phenol & its Derivative	R	A*	A*	R	N	A*	A*	A*	
Polymerisation Precursor & Production Waste	R	N	N	*	R	*	*	*	
Tannery Waste (Chrome tanning solution)	R	R	R	R	N	*	R	*	
Waste Catalyst	R	*	*	A*	A*	A*	A*	A*	

* Because of varying nature, please refer to Material Safety Data Sheet (MSDS) of individual chemical. If in doubt, technical advice should be sought.

A : Acceptable
 N : Not Recommended
 R : Recommended

HDPE = high density polyethylene
 PP = polypropylene
 PVC - polyvinylchloride

Table 3 Chemical Compatibility of Common Containers with Different Chemical Waste Types

3. LABELLING

3.1 General Requirements

- Every container of chemical waste should bear an appropriate label of the design specified in Figure 1. The label should contain the particulars set out in section 3.2 and of the dimensions set out in section 3.3.

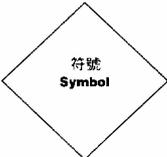
CHEMICAL WASTE 化學廢物	
 符號 Symbol	Chemical name/Common name 化學名稱或普通名稱
	Waste type and Code 廢物種類及代號
Name, address and Telephone No. of Waste producer 廢物產生者姓名、地址及電話	Particular Risks 危險情況 * * *
	Safety Precautions 安全措措 * * *

Figure 1 - Design of Label for Chemical Waste

- The waste producer should ensure that the information contained on the label is accurate and sufficient so as to enable proper and safe handling, storage and transport of the chemical waste.
- The label should be securely attached to a suitable part of the container which allows the information on the label to be easily read, and not obstructed or obscured by any part/fitting of the container. Labels should be attached to the sides of drums and not on the heads or tops. It is recommended to attach two labels on opposite side of the containers for the sake of secure labelling.
- For reused or reconditioned containers, the waste producer should ensure that any old labels on the containers have been completely removed or obliterated.

3.2 Particulars on the Label

- The label should contain the following particulars-
 - The English words "CHEMICAL WASTE" and Chinese characters "化學廢物".
 - The name, address and contact telephone number of the chemical waste producer.
 - The chemical name(s) or common name(s) of the process chemicals used and from which the chemical waste is derived (e.g. if the chemical waste is derived from a nickel plating bath, the label should include the chemical name "nickel"). For those wastes containing a mixture of many different chemicals, it is necessary to name all the major components of the waste.
 - If the chemical waste can be described according to the waste stream classifications set out in the booklet **A Guide to the Registration of Chemical Waste Producers**, the appropriate waste type and its code should also be entered.
 - The appropriate hazard symbol(s) as specified in Figure 2. Generally, most chemical waste will only require the use of one hazard symbol on the label. A list of common waste streams and their hazard classifications is given in Table 4. If the chemical waste possesses two or more hazards then, as a general guideline, the **primary hazard should be determined in the following order of priority-**
 - (i) chemical waste with explosive properties should always adopt the 'EXPLOSIVE' hazard symbol;
 - (ii) chemical waste which is liable to spontaneous combustion, or which become spontaneously flammable or give off flammable gases on contact with water, should adopt the 'FLAMMABLE' symbol;

Classification 危險分類	Symbol 符號	Classification 危險分類	Symbol 符號
Explosive 爆炸性	 <p>Black image on Orange Background</p>	Toxic 有毒	
Flammable 易燃	 <p>Black image on Red Background</p>	Harmful 有害	
Oxidizing 助燃	 <p>Black image on Yellow Background</p>	Corrosive 腐蝕性	
Irritant 刺激性		Asbestos 石棉	

Figure 2 – Symbols in Label

- (iii) chemical waste which is toxic by inhalation and classifiable as Category 4 (Class 1) DG under the DGO or Class 6 (Div.1) (Packing Groups I and II) DG under the UN Classification should adopt the 'TOXIC' hazard symbol;
- (iv) chemical waste which is a flammable liquid, having a flash point below 23°C (73°F), should adopt the 'FLAMMABLE' hazard symbol;
- (v) chemical waste which is a flammable liquid having a flash point at or above 23°C and is toxic or corrosive, should adopt the 'FLAMMABLE' hazard symbol;
- (vi) chemical waste which has oxidizing properties should adopt the 'OXIDIZING' hazard symbol;
- (vii) chemical waste which is a corrosive liquid and which may cause severe damage on contact with living tissue should adopt the 'CORROSIVE' hazard symbol;
- (viii) chemical waste which is classifiable as Category 4 (Class 1) DG under the DGO or Class 6 (Div.1) (Packing Groups I and II) DG under the UN Classification, other than those specified in (iii) above, should adopt the 'TOXIC' hazard symbol;
- (ix) chemical waste which has some toxic or poisonous properties, other than those covered in (iii) or (viii) above, should adopt the 'HARMFUL' hazard symbol;
- (x) chemical waste which can cause inflammation through immediate, prolonged or repeated contact with the skin or mucous membrane should adopt the 'IRRITANT' hazard symbol.

Waste Type	Hazard Classification
Spent Acid	Irritant/Corrosive (depending on strength)
Spent Alkali	Irritant/Corrosive (depending on strength)
Spent Solvent e.g. Ethanol, Toluene	Flammable
Halogenated Solvent	Toxic
Oil-water Mixture	Harmful
Cyanide Solution	Toxic
Heavy Metals with Acid	Toxic/Harmful
Heavy Metals	Toxic/Harmful
Chromium (VI) Containing Solution	Irritant
Asbestos e.g. Asbestos Lagging	Asbestos

Table 4 Labelling Requirements for some Major Chemical Waste Streams

In addition, the label should bear a second hazard symbol for any other secondary or subsidiary hazard.

- An indication of the particular risk(s) inherent in the chemical waste. A full list of recommended risk phrases are contained in Appendix A. They are identical to those specified in the Factories & Industrial Undertakings (Dangerous Substances) Regulations of that Ordinance, Cap. 59.
- An indication of the safety precautions required in respect of the chemical waste. A full list of the safety phrases are contained in Appendix B. They are identical to those specified in the Factories & Industrial Undertakings (Dangerous Substances) Regulations.

3.3 Dimensions of Labels

- The dimensions of the labels should be as follows:

Capacity of Container	Dimensions of Label
Not exceeding 50 litres	not less than 90mm x 100mm
Between 50 and 450 litres	not less than 120mm x 150mm
Over 450 litres	not less than 180mm x 200mm

- The combined size of the words "CHEMICAL WASTE" and characters "化學廢物" should not be less than 1/20th of the area of the label. For the small-size labels, the minimum size of the characters should be around 5mm high.
- The size of any symbol required to be shown on the label should not be less than one-tenth of the area of the label and in no case shall it be less than 500mm². Generally, the minimum dimensions should be 25mm x 25mm.

4. STORAGE

4.1 Provision of Storage Area

■ A chemical waste producer should provide a suitable area for temporary storage of chemical waste. The storage area should be located close to the source of waste generation, preferably within the premises of the waste producer to minimise waste handling and to facilitate management control. Where the storage area is located within a multi-storey building, factors such as the distance from the lift-lobby and exit/entrance should also be considered.

■ If there is no suitable space within the premises where the waste is generated, the waste producer should seek to provide an area in the vicinity, for example on

another floor of the same building. It is also possible for waste producers within the same industrial building to share a communal area for waste storage provided that all the relevant requirements of this section are complied with. For such a communal area, each waste producer would remain responsible for the custody and control of his own waste. This may be achieved by dividing the communal area into separate storage compartments for individual waste producers, with each compartment properly secured/locked to prevent unauthorized access by others.

4.2 General Requirements

- The storage area should be used for chemical waste storage only.
- The storage area should be enclosed on at least three sides by a wall, partition or fence with a height of not less than two metres or the total height of containers in stack, whichever is less. Suitable materials for the construction of such enclosures include concrete, brick, and steel with protective coating or treatment. The enclosures should be rigidly erected and fixed to the area. An illustration of a storage area layout is shown in Figure 3.
- Adequate ventilation should be allowed by leaving some space between the top of the enclosure walls and the ceiling, or provision of louvers on the sides of the enclosure walls.
- There should not be any connection to any surface water drains or foul sewers.
- Adequate space should be allowed within the storage area for container handling by workers. In situations where large containers (e.g. 210 litres drums) are stored, space should be allowed for the manoeuvring of a trolley or other lifting devices.

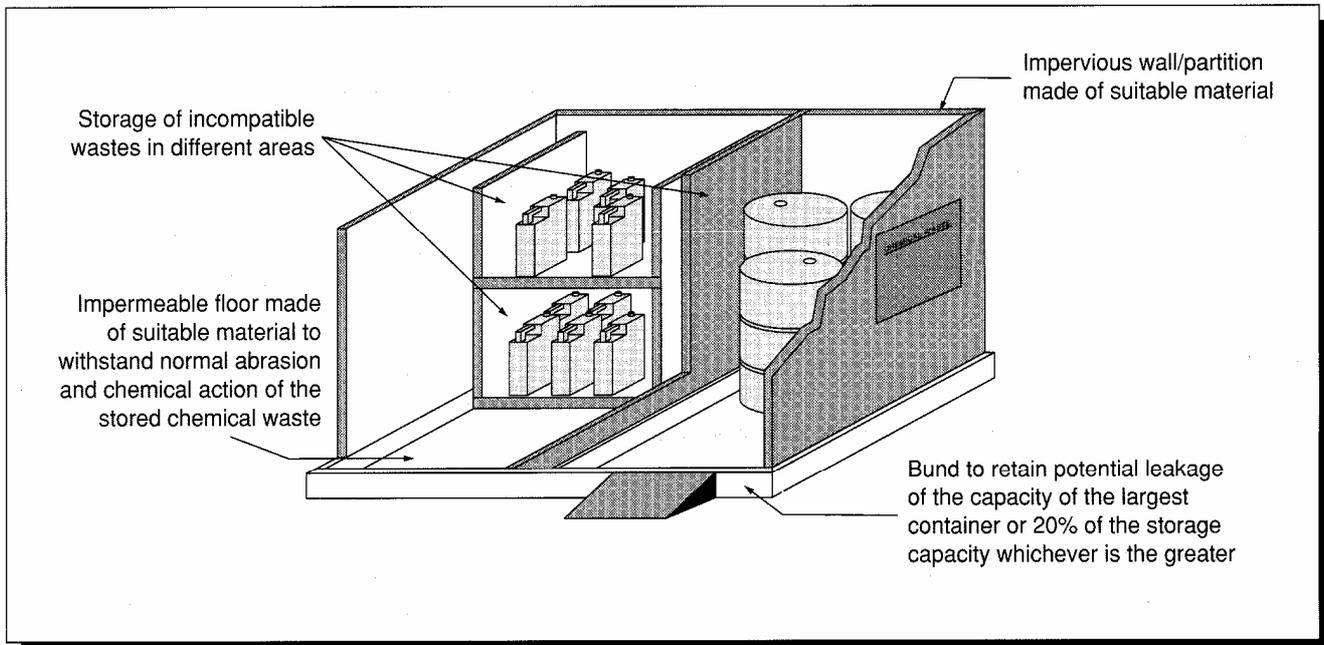


Figure 3 Schematic Drawing of a Chemical Waste Storage Area

- Where the storage area is located inside a multi-storey building, the location of the area should not obstruct any means of escape from the building.
- Where the storage area is not within a building, it should be provided with a roof or similar covering designed to prevent rain and reduce heat from sunlight. Where flooding of the area is likely, the floor area should be raised, for example by adopting a raised platform design.
- Where the storage area is not located within the premises in which chemical waste is produced, the storage area should be kept secured with an appropriate door/gate and locked at all time.
- The storage area should be kept clean and dry.
- The storage area should have an impermeable floor or surface made of suitable materials for the storage of containers of liquid chemical waste. An impermeable layer will prevent infiltration of liquid into the floor in case of leakage or spillage.

An example is to apply epoxy resin treatment to the floor surface and cover it by heavy duty floor tiles to protect the epoxy layer from chemical and physical damage. Other materials may be used but they must not be liable to chemical action with the waste to be stored. The mechanical property of the impermeable layer/structure should also be able to withstand normal loading and physical damage caused by container handling. The condition of the impermeable layer/surface should be regularly inspected to ensure it is satisfactorily maintained.

- Where containers of liquid chemical waste are stored, the area should be designed to contain the content of the largest container intended to be stored or 20% of the total quantity of the chemical waste stored, whichever is the greater. The height of such retention structure should not exceed 200 mm to allow convenient manual or mechanical lifting and handling of containers. An illustration of a possible structure is shown in Figure 3. The structure should be impermeable and the material used should not be liable to any chemical action

with the wastes which would render the structure ineffective. An example of suitable material for the structure is high density brickwork covered by a cement layer.

- Containers of incompatible chemical waste must not be stored together where potentially dangerous consequence may result in the event of contact between the wastes. Wastes that are incompatible generally include those that will react with each other
 - Violently and dangerously
 - With evolution of substantial heat or causing combustion
 - to produce flammable, poisonous or harmful gases or
 - to produce toxic, corrosive or unstable products.

A list of common chemical waste types that are incompatible with each other is given in Table 5.

More detailed guidance is included in Appendix C. The storage area should be so designed such that there are compartments for separate storage of the incompatible wastes. There should be impermeable partitions/walls erected between the compartments with a separate liquid retention structure for each of them.

- The stacking of containers of chemical wastes is allowed provided that -
 - (i) the enclosure walls or partitions of the storage area are constructed out of an impermeable material;
 - (ii) the stacks of containers are made secure so as to prevent their falling down; and
 - (iii) containers are stacked with each of them in the normal upright position and can be readily moved when full.

As a general rule, the maximum height of a stack should be limited to 2.5 metres.

INCOMPATIBLES		HAZARDS UPON MIXING
<u>A</u>	<u>B</u>	
Cyanides	Acids, Non-oxidizing	Generation of Hydrogen Cyanide. Inhalation of a small amount of the gas may be fatal.
Hypochlorites	Acids, Non-oxidizing	Generation of Chlorine. Inhalation may be fatal.
Copper, Chromium and many heavy metals	Acids, Oxidizing e.g. Nitric Acid	Generation of Nitrogen Dioxide, Nitrous Fumes, causing irritation of eyes and burns to skins.
Strong Acids	Strong Alkalis	May react explosively with generation of heat.
Ammonia Salts	Strong Alkalis	Generation of Ammonia, causing irritation of eyes and respiratory tracts on inhalation.
Oxidizing Agents	Reducing Agents	May react violently and explosively with generation of heat.

Table 5 Examples of Incompatible Waste Types

4.3 Alternative Arrangement for Small Waste Producers

■ The storage area requirements stipulated above can be complied with by the provision of a cupboard or cabinet of a robust design for small chemical waste producers, typically those requiring less than 300 litres of storage capacity in total, prior to collection or disposal of the waste. The cupboard or cabinet should be provided with -

- Storage shelves, which are fitted with a leakproof sill or spill catcher trays in its base to retain the capacity of the largest container or 20% of the total storage capacity in that shelf, whichever is the greater.
- Storage shelves which are strong enough to carry the full weight of the filled containers being stored.
- Ventilation holes of at least 30 mm diameter located at the top and bottom (above the sill) of the side panels of the cupboard/cabinet.

■ The material used for the construction of the cupboard or cabinet and the leakproof sill or spill catcher trays should be able to withstand the chemical action of the chemical waste stored in the containers. Steel with protective coating or treatment will generally be an acceptable material. Incompatible chemical wastes should either be stored separately or in compartments separated from each other by impermeable partitions. An illustration of such cupboard or cabinet is given in Figure 4.

4.4 Temporary Storage at Working Area

■ A small quantity of chemical waste, not exceeding 50 litres, may be stored at the working or processing area provided that it is appropriately packed and labelled in containers, and that the containers are kept in a cupboard,

cabinet or bin of robust design. The requirements set out in Section 4.3 above should be followed for the construction materials for the cupboard/cabinet. For incompatible chemical wastes, they should either be stored separately or in a cupboard, cabinet or bin provided with compartments constructed of impermeable partitions.

4.5 Containers with Residues

■ Containers which contain residues of chemical waste and have not been cleaned should be handled in the same manner as filled containers.

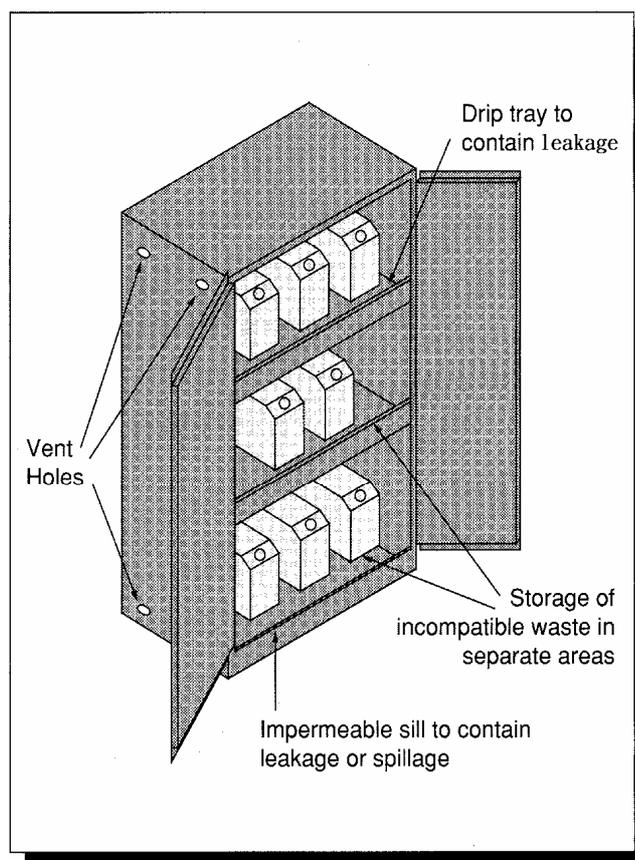


Figure 4 Key Features of a Chemical Waste Storage Cupboard

4.6. Storage of Chemical Waste Classified as Dangerous Goods

■ For chemical wastes classifiable as DG under the DGO, they should be handled in accordance with the DGO and its subsidiary legislation with respect to their conveyance and storage. The DG (General) Regulations require that a licence be obtained from the Director of Fire Services to store DGs above the exempted quantities. The details of the exempted quantities for different types of DGs and the licensing requirements for their storage are laid down in the DG (General) Regulations and booklets issued by the Fire Services Department (FSD). Details should be obtained from the Fire Services Bureau at the address in Appendix D. The licence requirements usually include the installation of a proper DG store to a standard approved by FSD.

5. SAFETY PROCEDURES

■ Chemical waste products should make the necessary arrangements and provide adequate supervision to prevent any danger or injury arising from the handling of chemical waste.

5.1 General Requirements

- Workers handling chemical waste should be competent and trained.
- Regular inspection of the storage area and its access should be made to ensure that it is free from obstruction and is kept dry and clean.
- Containers should be checked for leakage or spillage before use.
- Stacked containers should be made stable and safe from falling down.
- Incompatible wastes should be stored separately.
- Inventory of the types and quantities of chemical wastes being stored should be kept and regularly updated.

- No person should be allowed to eat, drink or smoke in the chemical waste storage area. Warning signs indicating "NO SMOKING, NO EATING, NO DRINKING" should be posted at the storage area.
- Unauthorized persons should not be allowed to enter the storage area.

5.2 Warning Signs at the Chemical Waste Storage Area

■ Every chemical waste storage area, including any cupboard, cabinet or bin, should display a hazard warning panel, notice or marking at or near the entrance or opening of the storage area and such panel, notice or marking should-

- Indicate the English words and Chinese characters "CHEMICAL WASTE" "化學廢物" clearly and boldly in red on a white background with a letter/character size of not less than 60 mm high.
- Be securely attached to or worked on a vertical plane of the storage structure.
- Be weather resistant and rigid.
- Be kept clean and free from obstruction.

5.3 Safety Training and Equipment

■ Waste producers should provide adequate safety information, training and equipment for employees or any other persons involved in the handling of chemical waste. Specifically, a waste producer should-

- Make available 'Safety data sheets' of all the chemicals which result in chemical waste generation, for easy reference by the persons concerned.
- Ensure that all employees understand the hazard symbols and the safety precautions in relation to the chemical wastes generated. A list of relevant

safety information on chemical handling published by the Labour Department is included in Appendix E.

- Provide the necessary safety equipment and ensure that such equipment is used by the employees in handling chemical waste. Safety equipment should also be kept in good condition and be cleaned regularly. Adequate first aid equipment should also be kept near the storage area. A list of essential safety equipment is given in Appendix F.

5.4 Emergency Procedures

■ Waste producers should prepare and make available written procedures for dealing with emergencies due to spillage, leakage or accidents arising from the handling and storage of chemical waste. General guidance for dealing with spillage and leakage of chemical waste is given in Appendix G. The waste producer should ensure that his employees or agents have received adequate instruction and training for implementing the procedures in the event of such emergencies. He should also provide adequate and suitable equipment to deal with such emergencies (see Appendix F).

6. EXEMPTION

■ Chemical waste which is produced by a household and of a kind that is ordinarily produced by a domestic dwelling is exempted from the requirements of the Regulation.

RISK PHRASES

LIST OF PARTICULAR RISKS

Single Risks

1. Explosive when dry
2. Risk of explosion by shock, friction, fire or other sources of ignition
3. Extreme risk of explosion by shock, friction, fire or other sources of ignition
4. Forms very sensitive explosive metallic compounds
5. Heating may cause an explosion
6. Explosive with or without contact with air
7. May cause fire
8. Contact with combustible material may cause fire
9. Explosive when mixed with combustible material
10. Flammable
11. Highly flammable
12. Extremely flammable
13. Extremely flammable liquefied gas
14. Reacts violently with water
15. Contact with water liberates highly flammable gases
16. Explosive when mixed with oxidizing substances
17. Spontaneously flammable in air
18. In use, may form flammable/explosive vapour-air mixture
19. May form explosive peroxides
20. Harmful by inhalation
21. Harmful by contact with skin
22. Harmful if swallowed
23. Toxic by inhalation
24. Toxic by contact with skin
25. Toxic if swallowed
26. Very toxic by inhalation
27. Very toxic by contact with skin
28. Very toxic if swallowed
29. Contact with water liberates toxic gas
30. Can become highly flammable in use
31. Contact with acids liberates toxic gas
32. Contact with acids liberates very toxic gas
33. Danger of cumulative effects
34. Causes burns
35. Causes severe burns
36. Irritating to eyes
37. Irritating to respiratory system
38. Irritating to skin
39. Dangers of very serious irreversible effects
40. Possible risk of irreversible effects
41. Risk of serious damage to eyes
42. May cause sensitisation by inhalation
43. May cause sensitisation by skin contact
44. Risk of explosion if heated under confinement
45. May cause cancer
46. May cause inheritable genetic damage
47. May cause birth defects
48. Danger of serious damage to health by prolonged exposure
49. Spontaneously combustible in air when wet

Combinations of Risks

- | | |
|----------|---|
| 14/15 | Reacts violently with water, liberating highly flammable gases |
| 15/29 | Contact with water liberates toxic, highly flammable gas |
| 20/21 | Harmful by inhalation and by contact with skin |
| 20/21/22 | Harmful by inhalation, by contact with skin and if swallowed |
| 20/22 | Harmful by inhalation and if swallowed |
| 21/22 | Harmful by contact with skin and if swallowed |
| 23/24 | Toxic by inhalation and by contact with skin |
| 23/24/25 | Toxic by inhalation, by contact with skin and if swallowed |
| 23/25 | Toxic by inhalation and if swallowed |
| 24/25 | Toxic by contact with skin and if swallowed |
| 26/27 | Very toxic by inhalation and by contact with skin |
| 26/27/28 | Very toxic by inhalation, by contact with skin and if swallowed |
| 26/28 | Very toxic by inhalation and if swallowed |
| 27/28 | Very toxic by contact with skin and if swallowed |
| 36/37 | Irritating to eyes and respiratory system |
| 36/37/38 | Irritating to eyes, respiratory system and skin |
| 36/38 | Irritating to eyes and skin |
| 37/38 | Irritating to respiratory system and skin |
| 42/43 | May cause sensitisation by inhalation and skin contact |

SAFETY PHRASES

LIST OF SAFETY PRECAUTIONS

Single Safety Precautions

1. Keep locked up
2. Keep in a cool place
3. Keep away from living quarters
4. Keep contents under....(appropriate liquid to be specified)
5. Keep under....(inert gas to be specified)
6. Keep container tightly closed
7. Keep container dry
8. Keep container in a well ventilated place
9. Do not keep the container sealed
10. Keep away from food, drink and animal feeding stuffs
11. Keep away from....(incompatible materials to be indicated)
12. Keep away from heat
13. Keep away from sources of ignition - No Smoking
14. Keep away from combustible material
15. Handle and open container with care
16. When using do not eat or drink
17. When using do not smoke
18. Do not breathe dust
19. Do not breathe gas/fumes/vapour/spray (appropriate wording to be specified)
20. Avoid contact with skin
21. Avoid contact with eyes
22. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice
23. Take off immediately all contaminated clothing
24. After contact with skin, wash immediately with plenty of....(to be specified)
25. Do not empty into drains
26. Never add water to this product
27. Take precautionary measures against static discharges
28. Avoid shock and friction
29. This material and its container must be disposed of safely by....(to be specified)
30. Wear suitable protective clothing
31. Wear suitable protective gloves
32. In case of insufficient ventilation, wear suitable respiratory equipment
33. Wear eye/face protection (appropriate wording to be specified)
34. To clean the floor and all objects contaminated by this material use....(to be specified)
35. In case of fire and/or explosion do not breathe fumes
36. During fumigation/spraying wear suitable respiratory equipment (appropriate wording to be specified)
37. In case of fire, use....(indicate in the space the precise type of fire-fighting equipment; if water increases the risk, add-"Never use water")
38. If you feel unwell, seek medical advice (show the label where possible)
39. In case of accident or if you feel unwell seek medical advice immediately (show the label where possible)
40. If swallowed seek medical advice immediately and show this container or label
41. Keep at temperature not exceeding.... °C (to be specified)
42. Keep wetted with....(appropriate material to be specified)
43. Keep only in the original container
44. Do not mix with....(to be specified)
45. Use only in well ventilated areas
46. Not recommended for interior use on large surface areas

Combinations of Safety Precautions

- | | |
|-----------|---|
| 2/6/8 | Keep container tightly closed, in a cool well ventilated place |
| 2/8 | Keep in a cool well ventilated place |
| 2/8/11 | Keep in a cool, well ventilated place away from....(incompatible materials to be indicated) |
| 2/8/11/43 | Keep only in the original container in a cool, well ventilated place away from...(incompatible materials to be indicated) |
| 2/8/43 | Keep only in the original container in a cool, well ventilated place |
| 2/11 | Keep in a cool place away from....(incompatible materials to be indicated) |
| 6/7 | Keep container tightly closed and dry |
| 6/8 | Keep container tightly closed and in a well ventilated place |

-
- 16/17 When using do not eat, drink or smoke
- 20/21 Avoid contact with skin and eyes
- 30/31 Wear suitable protective clothing and gloves
- 30/31/33 Wear suitable protective clothing, gloves and eye/face protective (appropriate wording to be specified)
- 30/33 Wear suitable protective clothing and eye/face protection (appropriate wording to be specified)
- 31/33 Wear suitable gloves and eye/face protection (appropriate wording to be specified)
- 41/43 Keep only in the original container at temperature not exceeding...°C (to be specified)

FOR ADVICE ON FIRE PREVENTION AND REQUIREMENTS OF DANGEROUS GOODS STORE

Fire Protection Bureau
Fire Services Department
1 Hong Chong Road
Tsim Sha Tsui East
Kowloon
Telephone Contact: 2723 8787

LIST OF SAFETY INFORMATION PUBLISHED BY THE LABOUR DEPARTMENT

- Classification & Labelling of Dangerous Substances Commonly used in Industry
- Safety Training Prospectus
- A Brief Guide to Industrial Safety
- Good Safety Measure in Factory Lowers Accident Rate and Boost Productivity (C)
- Dangerous/Safe Working Clothes (C)
- Industrial Safety Brochures for Workers (C):
 - Safety Handling of Chemicals Commonly Used in Industry
 - Guide to General Rules on Handling Chemicals and the First Aid
- Reporting Accidents and Dangerous Occurrences
- Hints on First Aid

FOR FURTHER ADVICE CONTACT

Occupational Safety and Health Branch
 Labour Department
 25th floor, Western Harbour Centre,
 181 Connaught Road West
 Hong Kong
 Telephone Contact: Advisory and Development Division
 2559 2297

Note: (C) Published in Chinese Version only

LIST OF SAFETY EQUIPMENT FOR SAFE HANDLING OF CHEMICAL WASTE

I. Personal Safety and Protective Equipment

- Safety helmets
- Safety glasses or goggles
- Chemical-resistant gloves or gauntlets
- Steel-toed rubber or plastic boots
- Protective clothing or overalls
- Appropriate respirators, gas masks
- Eye-wash bottle or device
- Face visor with hood
- First aid kits

II. Equipment for Handling Emergencies and Spillages

- Fire extinguishers
- Dustpan and brush
- Dry soft sand
- Mop and bucket
- Paper tissue and towelling
- Plastic bags, empty containers or drums
- Absorbent e.g. vermiculite, sawdust, etc.
- Scoop
- Tweezers or forceps
- Hand-operated pumps
- Suitable sampling device

GENERAL GUIDANCE FOR HANDLING CHEMICAL WASTE SPILLAGE/LEAKAGE AT INDUSTRIAL PREMISES

1. Instruct untrained personnel to keep at a safe distance well away from the spillage area.
2. If necessary, open windows, provide forced ventilation and close the door/doors of the room where the spillage/leakage take place.
3. If the spillage/leakage involves highly toxic, volatile or hazardous waste, initiate emergency evacuation and call the emergency service.
4. Only trained persons equipped with suitable protective clothing and equipment should be allowed to enter and clean up the waste spillage/leakage area.
5. (a) Spillage/leakage of liquid waste at storage area

Where the spillage/leakage is contained in the enclosed storage area, the waste can be transferred back into suitable containers by suitable handheld equipment, such as hand operated pumps, scoops or shovel. If the spillage/leakage quantity is small, it can be covered and mixed with suitable absorbing materials such as tissue paper, dry soft sand or vermiculite. The resultant slurry should be treated as chemical waste and transferred to suitable containers for disposal.

- (b) Spillage/leakage at other areas

For spillage/leakage in other areas, immediate action is required to contain the spillage/leakage. Suitable liquid absorbing materials such as tissue paper, dry soft sand or vermiculite should be used to cover the spill. The resultant slurry should be treated as chemical waste and transferred into containers for proper disposal.

6. Areas that have been contaminated by chemical waste spillage/leakage should be cleaned. While water is a suitable solvent for aqueous chemical wastes and water soluble organic waste, kerosene or turpentine should be used for organic chemical wastes that are not soluble in water. The waste from the cleanup operation should be treated and disposed of as chemical waste.
7. In incidents where the spillage/leakage may result in significant contamination of an area or risk of pollution, the Environmental Protection Department should be informed immediately.