

CHAPTER 8

HAZARDOUS MATERIALS and WASTE

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A. HAZARDOUS MATERIALS

√ **Are there materials in your workplace that are hazardous? If so, you should know:**

- Which ones are hazardous
- What their hazards are
- How you can work with them safely.

√ **Hazardous materials can be:**

- corrosive
- explosive
- flammable
- radioactive
- reactive
- toxic

√ **There are three routes chemicals can enter your body:**

- skin and eye contact (absorption)
- Inhalation (breathing)
- Ingestion (eating)

1. **Hospital Plan:** A KFSH&RC Hazardous Materials Plan will be developed and should provide a programme to control the hazards of hazardous materials. **The programme should address the following elements:**

- a. A written programme shall be consistent with local and international regulations/standards to identify, determine control, implementation and evaluation of all hazardous materials used or generated.
- b. The programme shall cover hazardous material inventory, selection, purchasing, storing, using/handling requirements, spill clean up measures and disposal methods.

2. **Department Responsibilities:** While we are working to develop a Hazardous Material Programme, as an interim measure, **departments are responsible for the following:**

- a. Each department is responsible for **identifying** and **labelling** all hazardous material within its department work area.
- b. All departments should **inventory** their hazardous materials, and review them for appropriateness as part of the overall department's inventory programme.
- c. A **Material Safety Data Sheet (MSDS)** must be obtained for every chemical identified as hazardous which is used in the department/section. MSDS's must be kept in users departments/sections for employee use.
- d. It is the responsibility of each department to provide **training** for individual staff who handle hazardous materials, training records must be maintained.
- e. **Emergency preparedness and spill clean up procedures** must be developed.
- f. **Purchase of all chemicals** including cleaning solutions, laundry chemicals and chemicals routinely used for facility and grounds maintenance **shall be accompanied by a MSDS.**

- g. A copy of the **MSDS** for each hazardous material order must be **forwarded to the Safety Section**.
- h. All **accidents/spills must be reported** to Environmental Services, Safety Section and any other departments or persons as the situation requires (i.e., Radiation Safety Officer in case radiation is involved, Lab Safety Officer, Research Centre Chemical Safety Officer, Clinical Engineering or others).

All hazardous materials received in a department shall be handled by appropriate personnel and shall be stored in an appropriate cabinet with proper ventilation, designated for chemical use only.

We will address the nature of hazardous materials, and how they should be labelled, MSDS and their usefulness in preplanning for hazardous material emergencies, extinguishing tactics, and environmental protection aspects.

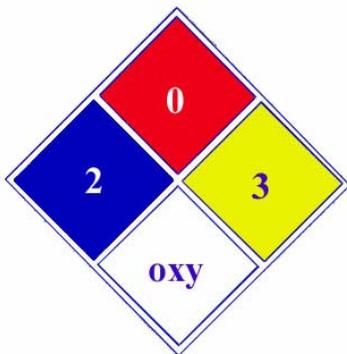
Because of the large number of hazardous materials used in KFSH&RC, we will not list all hazardous materials, instead you should get information about the hazardous materials used in your work environment from your supervisor and the MSDS which should be available in your work area (if not available ask your Supervisor/Safety Section for it).

Hazardous materials can be divided into three groups according to their effects: substances that affect **HEALTH**, substances that affect **FIRE**, and substances that may **REACT VIOLENTLY**. Hazardous materials may have more than one of these affects, so it is critical to be aware of all the hazards associated with a substance.

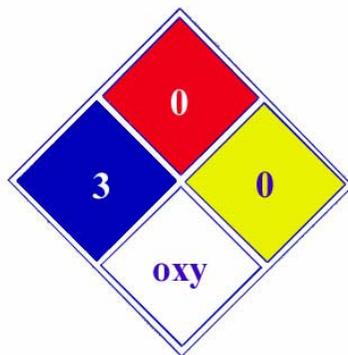
- 3. **Health Hazards:** Materials that can affect health include poisons and other toxic substances that may enter the body through breathing (inspiration), swallowing (ingestion), or injecting through the skin (absorbtion).
- 4. **Fire Hazards:** Fire hazardous materials may be in liquid, solid or gaseous form. All flammable liquids, by definition, are considered hazardous. A **flammable liquid** is a substance that has a flash point less than 100°F. The flash point of a liquid is the temperature at which the liquid releases vapours in sufficient concentration to support ignition by an external ignition source near the surface of the liquid. **Flammable solids** are solid materials that are easily ignited and that burn rapidly.
- 5. **Reactive hazards**, some materials are classified as hazardous because of the volatile way they react with other substances or with themselves. **Explosives** are material that will detonate or will deflagrate. **Oxidizing agents** (which can be strong corrosives) give off oxygen and support combustion. The reaction of oxidizers with other substances frequently generates heat. Some substances will react violently even explosively when water or moisture is added to them. Other substances may react in the same way when they come in contact with air.

6. To avoid problems, be prepared:

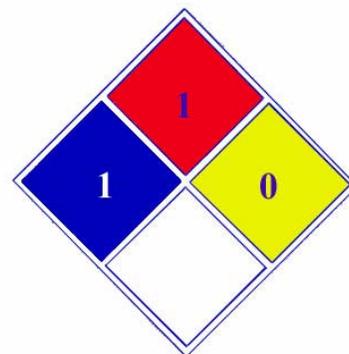
- a. **The label** – usually tells you at a glance:
- i) what is in the container
 - ii) what the hazard could be (health, fire reactivity, etc.)
 - iii) special instructions
 - iv) how to protect yourself
 - v) basic first aid



Hydrogen Peroxide

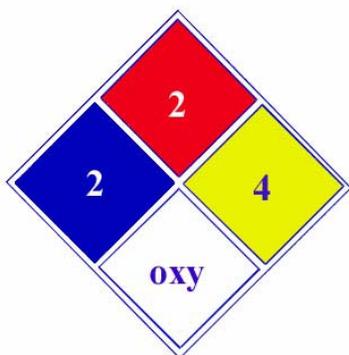


Liquid Oxygen

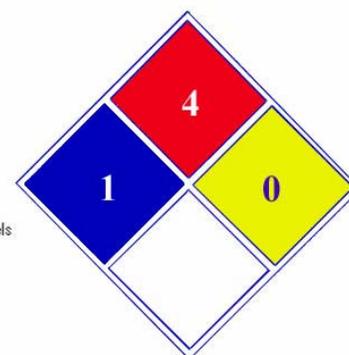
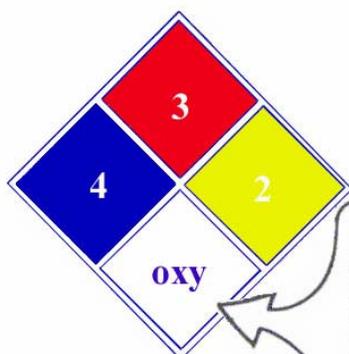


Sulfur

In these examples, **Liquid Oxygen** would be the most dangerous to **health**; **Butane** the most **flammable**; and **Nitroglycerine** the most **unstable**. **Hydrogenperoxide and Liquid Oxygen** are both **oxidizers**; and although they will not burn (flammability rating = 0), they will release oxygen, thus supporting combustion.



Nitroglycerine



Butane

Hazardous Materials Labels
 WHITE = Specific Hazard
 OX = Oxidizer
 ACID = Acid
 ALK = Alkali
 COR = Corrosive
 Use no water
 = Radioactive

- b. Use the **Material Safety Data Sheet (MSDS)**, it fills in the details that do not fit on a label. MSDS's should be available in your area.
- c. **Personal Protective Equipment (PPE)** might be required, such as:
- i) safety glasses, goggles, or face shields
 - ii) gloves
 - iii) rubber boots or special shoes
 - iv) respirators
- d. **Before using** hazardous materials:
- i) Remove things that could burn, explode or react dangerously with nearby materials.
 - ii) Know where emergency showers and eyewashes are located.

- iii) Make sure the correct type of fire safety equipment is nearby and ready for use.
- iv) Check for adequate ventilation.
- v) Know what to do in an emergency.
- vi) Assemble the PPE you will need for the job
- vii) Consult with **Material Safety Data Sheets (MSDS)**, please refer to MSDS Section in this Chapter.

7. **Laboratory Chemicals***: Laboratories within KFSH&RC have a special written plan to keep you safe. The **Chemical Hygiene Plan** covers the specific operating procedures and safety concerns of your individual laboratory. Always follow the procedures in your laboratory's plan.

The Chemical Hygiene Plan is designed to protect you from the health hazards associated with hazardous chemicals in your laboratory. **The Chemical Hygiene Plan outlines the specific work practices and procedures covering:**

- a) Procedures to follow when working with hazardous chemicals.
- b) Details on how your chemical exposure will be monitored and limited.
- c) Ensures that you have the right protective equipment such as a fume hood and that it works properly.
- d) Specifies that some hazardous tasks be approved in advance by your supervisor.
- e) Assumes any unfamiliar chemical is hazardous.
- f) Considers a mixture to be at least as hazardous as its most hazardous component.
- g) Do not use any unlabeled substance.
- h) Strictly follow all chemical safety instructions and procedures.
- i) Use common sense and be cautious around all laboratory equipment.
- j) For further safety tips please refer to the Laboratory Safety Guidelines in Chapter 5.

** When Laboratories are mentioned in this manual, the intention is to cover the Hospital clinical laboratories and all laboratories within the Research Centre.*

8. **Classes Of Hazardous Materials**: There are nine classes of hazardous materials. Each class has a distinctive symbol for labeling containers.

- a. Explosives
- b. Gases
- c. Flammable liquids
- d. Flammable solids and materials that are dangerous when wet
- e. Oxidizers and organic peroxides
- f. Poisonous and etiologic materials
- g. Radioactive materials
- h. Corrosive
- i. Miscellaneous hazardous materials

Are MSDS available for all staff working with chemicals?

9. Hazardous Material Emergency Training

The Laboratory and Research Centre will provide the training required to cover:

- a. All workers who are likely to discover a hazardous material spill/release and who will be trained to notify the proper personnel.
- b. All workers at the operation level are trained to contain a spill/release from a safe distance and keep it from spreading and stop the release of hazardous materials.
- c. On-site cooperation and knowledge of specific chemicals to government officials.
- d. Controlling an incident scene during emergency response.

Are PPE inspected regularly?

10. **Decontamination:** Decontamination neutralizes harmful contaminants and removes them from personnel and equipment. Decontamination also reduces the chance that contaminants will be carried out of the release area.

There are two major methods of decontamination – physical and chemical. Physical is done by diluting with water or blowing with air jets. Chemical is done by neutralizing hazardous materials with chemicals.



The **Riyadh Civil Defense Decon Officer** will decide which method will be used, and will also provide the materials and equipment for this activity. The decision will be based on the physical and chemical properties of the contaminant and degree of exposure.

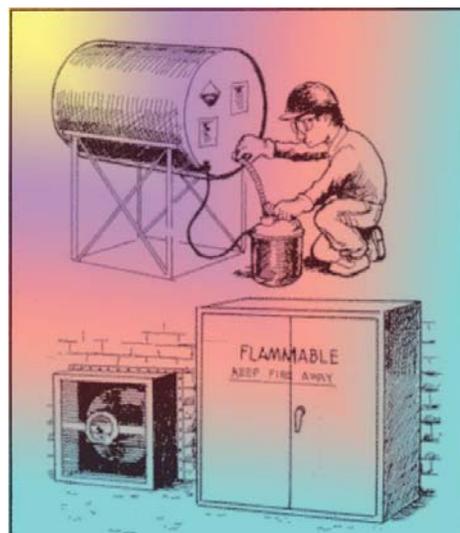
The Decon site will be divided into hot, warm and cold zones.

- The **Hot Zone** is the area of greatest contamination.
- The **Warm Zone** is the area of reduced risk just outside the Hot Zone.
- The **Cold Zone** is the area where exposure is least likely.

11. Safe Storage And Handling Of Hazardous Materials

- a. All chemicals shall be properly labelled with the description of hazard that they present and MSDS shall accompany all ordered chemicals.
- b. Materials which are toxic as stored or which can decompose into toxic components from contact with heat, moisture, acid fumes shall be stored in a cool, well ventilated place out of the direct rays of the sun. Incompatible toxic materials shall be isolated from each other.

- c. All flammable and combustible liquids should be kept in closed containers when they are not in use.
- d. Materials which ignite easily under normal conditions (flammable) shall be stored in a cool, dry, well ventilated storage space.
- e. Store according to hazardous nature of chemical using appropriate security when necessary.
- f. Store large bottles of acids on low shelf or in acid cabinets.
- g. Segregate acids from bases and active metals.
- h. Segregate acids from chemicals which could generate toxic gases upon contact such as iron, sulfide, etc.
- i. Acids and acid fume sensitive materials shall be stored in cool, dry, well ventilated areas.
- j. Use bottle carriers for transporting acid bottles.
- k. Have spill control pillows and acid / caustic neutralizers available in case of acid or caustic spills.
- l. Store solutions of inorganic hydroxides in polyethylene containers.
- m. Store pyrophoric substances in cool and dry place.
- n. Store water reactive chemicals in a cool and dry place.
- o. Store oxidizers in a cool and dry place, and do not store close to liquid of low flashpoint.
- p. Segregate oxidizing agents from organic acids, flammable and combustible materials.
- q. Keep oxidizers away from reducing agents such as zinc, alkaline, metals and formic acid.
- r. Segregate flammable from oxidizing acids and oxidizers.
- s. Store flammable liquids in approved safety cans or cabinets.
- t. Keep away any source of ignition, flames, localized heat or sparks.
- u. Corrosives shall be isolated from other materials and shall be stored in a cool, well ventilated area.
- v. Safety cans containing flammable liquids should be grounded and bonded when being used.
- w. Fire fighting equipment shall be readily available. An automatic fire fighting system and smoke detection system shall be provided
- x. Have spill cleanup materials handy.
- y. Store highly volatile flammable liquids in a specially equipped refrigerator.
- z. In case of fire involving water-reactive chemicals, keep water away.



- aa. Store light-sensitive chemicals in amber bottles, in a cool and dry place.
- bb. Avoid light sensitive chemical exposure to light.
- cc. Store peroxide forming chemicals in airtight containers in a dark, cool and dry place.
- dd. Test for the presence of peroxides periodically.
- ee. Dispose of peroxide forming chemicals before expected date of first peroxide formation in accordance with the manufacturer.
- ff. Use the right chemical protective clothing for the job at hand. The PPE shall be available for use when handling chemicals.
- gg. Do routine inspections.
- hh. Hazardous waste should not be stored outside a building.
- ii. Compressed gas cylinders shall be handled, stored and used in a manner that will prevent damage to the valve. Secure them when in an upright position or on hand trucks, or lay them flat, blocked in place. Always have cylinder caps securely in place whenever the cylinder, regardless if full or empty, is not in service.
- jj. Oxygen and oil make an explosive mixture. Never use any petroleum in or near any oxygen system component or equipment.
- kk. Restrict access to the building where the chemical is being stored.
- ll. Gases should be separated in storage areas in accordance with 2-1.3 NFPA 55.
- mm. Flammable gases shall be stored in accordance with NFPA 50, 51, 55 & 58.
- nn. Toxic gases shall be stored in accordance with 2-1.5 and Ch 3 of NFPA 55.
- oo. Storage shall be protected by an automatic fire extinguishing system in accordance with NFPA 13 or NFPA 15.
- pp. **HAZARDOUS – KEEP AWAY** signs shall be posted in all flammable gas or chemical cabinets. The cabinet shall be operated at negative pressure.

- 12. Chemical Group Precautionary Measures:** It is true that many hazardous chemicals are unpredictable under certain conditions such as when mixed with another chemical. However, even if you are unable to predict exactly what a hazardous material will do, you must have guidelines to assist you.

It would be hopelessly impossible for you to memorize the actions you should take for each of the more than 15,000 known hazardous materials in existence today. Yet, by grouping chemicals, we can give you basic guidelines to follow for each group. Let's examine these groups and the basic guidelines that apply to each.

a. Combustion By-Products

Examples: carbon monoxide, nitrogen oxide, hydrogen sulfide, sulfur dioxide, acrolein, ammonia phosgene, phosphine, hydrogen.

By-products of combustion are not new to fire fighters. However, all of these products, are highly toxic by inhalation. Therefore, BA for protection must be worn. Some of these materials

will damage the skin. In any event, protective clothing should be worn. Most of these materials are water soluble, so water fog should be used to dilute and disperse the vapours.

b. Water Reactive Materials

Examples: lithium, sodium, potassium, metal hydrides, carbides, organo-metallic compound

All of these materials will react with water to produce heat and a flammable gas, usually hydrogen. They are also highly corrosive, and will react with all common extinguishing agents. Fire fighters must wear protective clothing, BA and evacuate the area. Special dry powder can be used, but this is only effective on small fires. These are highly toxic.

c. Pressurized and Liquefied Gases

Examples: acetylene, hydrogen, oxygen, chlorine, carbon dioxide, compressed air, ammonia, butane, propane.

Containers containing pressurized and liquefied gases are extremely dangerous under fire conditions. When heated, excessive internal pressure will build up which is beyond the capability of relieving devices, and the container will rupture. When a rupture does occur, it is impossible to predict the direction of flying fragments. The decision to attack fires involving pressurized containers is a critical one. Containers can rupture in very short periods of time. Ample water must be applied to pressurized containers when exposed to heat. Flow of gas should be shut off and fire fighters must wear BA and protective clothing.

Are MSDS's available for all staff working with chemicals?

Protective clothing is another important line of defense against infectious waste. Use every method available to protect yourself from hazardous medical waste.

d. Flammable Liquids (Non-Petroleum)

Examples: alcohols, aldehydes, ketones, esthers, ethers, ammines

These are toxic and corrosive liquids which react violently when decomposing under fire conditions. Foam, carbon dioxide, and dry chemical should be used to fight fires on soluble flammable liquids. Fire fighters must wear BA and protective clothing.

e. Flammable Solids

Examples: naphthalene, camphor, carbon phosphorous, sulphur

These solids present an explosive potential when in dust form and some are pyrophoric, that is they will ignite spontaneously in dry or moist air. Most produce highly toxic gases when burning. Large volumes of water should be used to extinguish fires. Protection against toxic gases is required and fire fighters should wear BA and protective clothing.

f. Explosives

Examples: azides, fulminates, nitrocompounds (nitroglycerine, TNT, dynamite, picric acid)

These materials present an extreme hazard due to their sensitivity to heat and shock, and fires should be fought from a distance. When it is not possible to fight the fire from a safe distance and explosion is imminent, you must evacuate the area.

g. Poisons

Examples: **Cyanides** – hydrogen cyanide, sodium cyanide
Fumigants – sulfur dioxide
Heavy Metals – mercury, arsenic, lead
Pesticides – DDT, parathion, malathion

Poisons can enter the body in three ways: **first – inhalation** which causes asphyxiation and lung damage. **Second – ingestion** which causes internal organ damage. **Third – skin contact** which destroys tissue.

Toxicity is measured by threshold limits, which are assigned to each poison. These limits must be monitored and should not be exceeded. However, you must treat all poisons or chemicals as highly toxic and highly corrosive until reliable information is obtained.

When poisons are involved in an emergency, BA, protective clothing and decontamination processes all must be required. Evacuation may be considered and required.

The Hospital is phasing out the use of mercury containing equipment including sphygmomanometers and thermometers.

h. Corrosives

Examples: **Acids** – sulfuric, nitric, acetic, carbolic, chlorosulfuric
Alkalies – caustic soda, caustic potash, lime
Halogens – fluorine, chlorine, promine, iodine

All corrosives destroy human tissue. Many react violently with water such as chlorosulphuric acid. Some are flammable and some react with other materials to start fires. All corrosives are highly toxic. Fire fighters must wear BA and protective clothing in emergencies. Be sure that substances are not water-reactive before washing any spills.

Tools, equipment, and personnel must be decontaminated any time corrosives are encountered. Decontamination procedures must be followed.

i. Cryogenics

Examples: liquid oxygen, liquid hydrogen, liquid nitrogen, liquid carbon monoxide, liquid natural gas

These substances have a temperature below -150° F (extremely cold) and can be both flammable and toxic. When released into the atmosphere they expand in a very high vapour. In case of fire exposure, hose streams at sufficient volume and pressure should be employed to reduce the chance of rupture due to over pressurization.

j. Oxidizing Agents

Examples: nitrates, nitrites, chlorates, chlorites

These substances decompose when heated, giving off heat, toxic gases and oxygen. When involved in fire, intense flame, heat and even explosions can result. Flood the area with deluge quantities of water from a safe distance when oxidizing agents are involved in a fire.

k. Unstable Materials

Examples: organic peroxides, inorganic peroxides

These substances are highly flammable and toxic. They are also shock and friction sensitive, causing explosions. They decompose to give off heat and oxygen and form highly flammable mixtures and many materials. Evacuate the immediate area and concentrate on protecting exposures if peroxides are burning. You cannot predict what will happen with unstable materials and you must expect the worst possible conditions.

13. DEGREE OF HAZARD IDENTIFICATION FOR HAZARDOUS MATERIALS

Below is a system for marking the degree of hazardous materials which provides a simple and easily understood system. It also provides a general idea of the hazard of the materials and the severity of their hazards.

Identification of Health Hazard Colour Code: BLUE		Identification of Flammability Colour Code: RED		Identification of Reactivity (Stability) Colour Code: YELLOW	
Type of Possible Injury		Susceptibility of Materials to Burning		Susceptibility to Release of Energy	
Signal		Signal		Signal	
4	Materials that on very short exposure could cause death or major residual injury.	4	Materials which will rapidly or completely vapourize At atmospheric pressure and normal ambient temperature, or that are readily dispersed in air and that will burn readily.	4	Materials that in themselves are readily capable of detonation or of explosive decomposition or reaction at normal temperatures and pressures.
3	Materials that on short exposure could cause serious temporary or residual injury.	3	Liquids and solids that can be ignited under almost all ambient temperature conditions.	3	Materials that in themselves are capable of detonation or explosive decomposition or reaction but require a strong initiating source or which react explosively with water.
2	Materials that on intense or continued but not chronic exposure could cause temporary incapacitation or possible residual injury.	2	Materials that must be moderately heated or exposed to relatively high ambient temperatures before ignition can occur.	2	Materials that readily undergo violent chemical change at elevated temperatures and pressures or which react violently with water or which may form explosive mixtures with water.
1	Materials that on exposure under fire conditions would offer no hazard beyond that of ordinary combustible material.	1	Materials that must be preheated before ignition can occur.	1	Materials that in themselves are normally stable, but which can become unstable at elevated temperatures and pressures.
0	Materials that on exposure under fire conditions would offer no hazard beyond that of ordinary combustible material	0	Materials that will not burn.	0	Materials that in themselves are normally stable, even under fire exposure conditions, and which are not reactive with water.

B. HAZARDOUS WASTE

KFSH&RC chooses to dispose of its hazardous waste through a contractor; however, this decision was made after identifying the types of hospital hazardous waste, identifying the regulatory requirements which must be met by the contractor, and also determining the best waste management option. Therefore, in this Section you will find general information regarding the waste classification, the waste separation and packaging of different colours that are part of the Hospital policies, and you will find requirements that the contractor must comply with which are actually part of the existing contract.

KFSH&RC's long term objectives in respect to hazardous medical waste including infectious waste and radioactive waste is to provide technical guidance in hazardous waste segregation, collection, packaging, storage, transporting, treating and finally proper safe disposal. KFSH&RC is working to develop cost effective alternatives for medical hazardous waste disposal.

A leadership commitment is to seek long term solutions to the broader problems of hazardous waste confronting our Hospital today. This objective will certainly include waste management minimization for both general and hazardous waste.

1. Categorization of Hospital Waste

a. General Waste

Consists of all waste materials that are not regulated or defined as hazardous and do not require special handling and disposal. These wastes are sometimes referred to as non-regulated medical waste. General waste is generated by almost every aspect of the Hospital including administration, support services, Utilities & Maintenance, patient rooms, nursing stations, Food Services (even this type of waste has some special disposal considerations) and many areas throughout the Hospital.

Although the above waste is not considered hazardous; such waste can pollute the environment. Therefore, KFSH&RC is reducing solid waste by establishing recycling programmes. Even though some hazardous waste such as xylene is being recycled in KFSH&RC, all departments are encouraged to reduce their waste and great effort is requested from all managers to plan for reclamation, recycling or reusing, and if necessary, and it does not effect performance, to modify processes to contribute to reduction in waste.

b. Medical Waste

Is defined as all waste generated from health care facilities, the type of waste classified as medical waste may vary according to the institution in which it is generated. This type of waste is regulated and requires special handling and disposal. The different types of medical waste generated by KFSH&RC are: **chemical, radioactive and infectious.**

i. Chemical Waste: Chemical waste is substances such as:

- Germicides
- Cleaning solvents
- Pharmaceuticals
- Chemicals that are expired or no longer used

Chemical waste can create hazardous situations like fire or explosion. It can harm your health. Make sure you know where to find the Material Safety Data Sheet (MSDS). It gives you information on how to handle and store the chemical safely, and may include specific disposal information.

Always place materials and waste in the right bag as established by the KFSH&RC colour coded system.

Do not pour chemicals down the drain. If you are not sure about chemical disposal, ask the Laboratory Hygiene Officer, Laboratory Safety Officer, Environmental Officer or Safety Officer.

ii. Xylene Waste Spills: Although KFSH&RC is recycling this chemical; the following precautions should be taken when dealing with xylene waste spills.

- Immediately inform Housekeeping.
- Proper protective clothing must be worn. This includes solvent resistant gloves and respiratory protection.
- Call the Chemical Hygiene Officer at ext 27231, also inform the Security Control Room at ext 35420.
- In case of large spill, follow steps set out in the “Chemical Hygiene Plan”.
- Small spills can be cleaned up easily by using a chemical spill kit which is available in the Laboratory.

Waste disposal requirements should be obtained from your department or Environmental Services

iii. Radioactive Waste: Radioactive waste has dramatically increased with the recent advances in nuclear medicine, and is found in:

- Iodine 123
- Iodine 131
- Thallium 201

Although radioactive materials and waste is the responsibility of the Research Centre, and we are confident that all radioactive materials in KFSH&RC are disposed of in accordance with the Nuclear Regulatory Commission Regulations (NRCR); we should mention that radioactive waste is any waste that contains or is contaminated with liquid or solid radioactive material. It is not generated by x-rays or other external beam therapy procedures. It is important to ensure all disposing wastes are placed with the radiation sign in a **Yellow bag**. Always keep radioactive waste separate from other types of waste. If you need assistance, contact the Radiation Safety Officer at pager **7031**.

iv. Infectious Waste: Infectious waste is a very important part of the medical waste disposal, because more employees and departments are directly involved with infectious waste than any other type of hazardous materials present in the Hospital. **Infectious materials are handled every day and include:**

- Laboratory cultures
- Blood and blood products from emergency rooms, operating rooms, pathology laboratories, patient rooms, laboratories, clinics, dental clinics, autopsy and blood bank.
- Sharps
- Renal dialysis waste
- Contaminated animal carcasses, body parts and bedding.

Infectious waste means any waste material that has the potential to carry disease that includes the following:

- Sharp infectious waste objects must be labeled in leak proof, puncture resistant containers.
- All KFSH&RC employees should be vaccinated as the first line of defense against disease is inoculation.
- The most effective method of protecting yourself is implementation of Universal Precautions. This means that all KFSH&RC employees are required to treat all blood and potentially infectious waste as if infected.
- Dispose of sharps properly.
- Never bend, shear, recap or resheath by hand.
- Use a broom and dustpan to pick up broken glass.
- Every KFSH&RC employee and medical research personnel must follow the safety guidelines established for the use of protective clothing and equipment on the job.
- KFSH&RC recommends the incineration method for infectious waste as part of the contract. Incinerators must have the ability to destroy pathogens.

2. Segregation of Waste System: The Hospital employs a waste classification system to effectively sort and handle the various types of waste generated by the Hospital and protect our staff and the community from contamination. Waste is sorted as follows:

Red bags used for isolation biological/contaminated waste

Yellow bags used for radioactive waste

Orange bags used for toxic waste

Blue bags used for general waste

Black bags (55 gal) used for regular trash (UMD, Food Services)

KFSH&RC follows the requirements that all blood and body fluids from operating rooms shall be placed in double red bags. Blood and body fluids from other areas are usually contained and require only single bagging.

Waste Management – Facts Sheet

General Waste:	not considered infectious, potentially infectious or hazardous.
Infectious Waste:	generated in the diagnosis, treatment, or immunization of human beings or animals.
Chemotherapy Waste:	resulting from the production or use of antineoplastic agent.
Radioactive Waste:	related to the use of radioactive supplies, containers and radioactive iodine.

Comments:

- * Items used in patient care will be disposed of in accordance with their potential to cause infection during and after handling.
- * There is no evidence to suggest hospital waste is any more infective than residential waste – **BLUE PLASTIC BAGS.**
- * Plastic containers appropriately labeled with a biohazard symbol will be used for containment of medical infectious waste – **RED PLASTIC CONTAINERS.**
- * All waste from Operating Rooms and intensive care units will be managed as medical infectious waste – **RED PLASTIC BAGS.**
- * **ORANGE PLASTIC BAGS** – will be used for chemotherapy waste arising from the preparation and administration of chemotherapy.
- * **YELLOW PLASTIC BAGS** – will be used for Radioactive waste and materials generated in the use of Radioactive supplies.

Sharps:

- * Medical items such as scalpel blades and hypodermic needles require careful disposal into rigid, puncture proof containers called **SHARPS BOXES** located in all patient care areas.
- ** Broken or unbroken glass used in animal or patient care including items such as Pasteur pipettes and blood vials are sharps or potential sharps designated for incineration.
- ** Other glass and plastic material may be disposed of as solid waste in rigid containers designated for glass disposal.
- * **NEVER** re-cap needles.
- * **DO NOT** bend or break needles.
- * **ALWAYS** dispose of used needles in **Yellow Puncture resistant containers.**
- * **CHANGE** needle disposal containers when $\frac{3}{4}$ full.
- * **SUBMIT** an Incident Report if you are injured by needle stick/sharp object/instrument.

Waste Management Color – Coding System

PATIENT CARE RELATED WASTE ITEMS	Incineration Red Bag	Land-Fill Blue Bag	Incineration Chemotherapy Waste Orange Bag	Incineration Sharps Boxes	Radioactive Waste Yellow Bag
CHUX PADS, DIAPERS, PERIPADS		X			
DISPOSABLE BED PANS, URINAL, BASINS		X			
FOLEY CATHETERS AND FOLEY CATHETER TUBING/BAGS (EMPTY)		X			
GAUZE AND DRESSINGS (NOT SATURATED TO THE POINT OF DRIPPING)		X			
IV/ARTERIAL CATHETER (NON-METAL)		X			
IV/TUBING AND BAG (EMPTY)		X			
OCCULT BLOOD TEST CARDS		X			
SUCTION CATHETERS AND ENDOTRACHEAL TUBES		X			
SYRINGES USED ON INFUSION PUMPS (ONLY IF BARREL OF UNIT IS UTILIZED)		X			
TISSUES AND PAPER TOWELS		X			
VENTILATOR CIRCUITS		X			
BLOOD/BLOOD-PRODUCT TUBING AND BAGS	X				
DRAINAGE COLLECTION DEVICES (E.G. HEMOVACS, PLEURO-VACS, JACKSON PRATT)	X				
HEMODIALYSIS TUBING AND DIALYSER	X				
ISOLATION WASTE FROM CONTACT AND SPECIAL ORGANISM PRECAUTIONS	X				
NASOGASTRIC/DUODENAL/GASTROSTOMY TUBES	X				
SUCTION CANISTER LINERS	X				
WASTE GENERATED IN OPERATING ROOMS, ICU'S AND DELIVERY ROOMS	X				
BUTTERFLY NEEDLES				X	
LANCETS, SCALPELS, SCISSORS				X	
NEEDLES (USED AND UNUSED IF OPEN)				X	
SYRINGES WITH NEEDLES ATTACHED OR CONTAINING BLOOD OR BODY FLUIDS				X	
USED OR EXPIRED VACCINE VIALS				X	
CHEMOTHERAPY WASTE INCLUDES ALL PERSONAL PROTECTIVE EQUIPMENT (PPE) USED WHILE PREPARING OR DISPENSING AND ITEMS CONTAMINATED WITH EXCRETION OF THE PATIENTS FOR 72 HOURS AFTER INITIATION OF TREATMENT			X		
ALL RADIOACTIVE WASTE AND MATERIAL GENERATED RELATED TO THE USE OF RADIOACTIVE SUPPLIES					X

3. Hazardous Waste Disposal Contract Conditions: KFSH&RC has chosen to dispose of our hazardous waste through the services of a contractor, on condition that all safety and environmental protection concerns are addressed, in addition the contractor must be reputable, certified by the national and international regulations. However, **the following assessment of a contractor and their facility should be considered during any future tendering process.**

a. Equipment:

- Process equipment and associated exhausts.
- Hazardous waste tanks (if above or below ground)
- Certification by the relevant authority
- Chemical ventilation system in all buildings and process centres

b. Process and Operations:

- Hazardous material storage, treatment and disposal operations
- Chemical dispensing for waste consolidation activities
- Identification of waste stream
- Corrective actions for compliance problems

c. Safety and Security:

- Adequacy of fire suppression systems. All fire suppression systems are tested on set schedule. All portable fire extinguishers are checked regularly to ensure readiness and availability.
- Security of the site, individual buildings, hazardous materials and waste storage areas and docks
- Designation of adequate evacuation routes to be used in case of an emergency
- Exit signs are placed properly and lighted at all times
- Spill containment programme
- Documentation

d. Inspections and Monitoring Requirement: The contractor must, from the safety point of view, comply with the following inspections and monitoring requirements:

Continuous monitoring of combustion temperature, waste feed rate and the indicator of combustion gas velocity specified in the permit while incinerating hazardous waste.

- a. Monitoring of carbon monoxide on a continuous basis at a point in the incinerator downstream of the combustion zone and prior release to the atmosphere while incinerating hazardous waste.
- b. Conduct sampling and analysis of the waste exhaust emission to verify that the operating requirements established in the permit achieve the required performance standard.
- c. Daily inspection of the incinerator and associated equipment such as pumps, valves, conveyors, and pipes for leaks, spills, fugitive emissions and signs of tampering
- d. Weekly inspection of the emergency waste feed, cut-off system and associated alarms to verify operability.
- e. Monthly operational testing.

- f. Inspection of above ground (if existing) portions of the tank system for cracks, leaks or corrosion.
- g. Inspection of all gauges such as pressure or temperature and monitoring leak detection equipment to ensure that the tank system is being operated according to design.
- h. Spill prevention control, such as check valves and dry disconnect couplings.
- i. Overfill prevention controls such as level sensing devices, high level alarms, automatic feed cut-off or bypass to the standby tank.

The contractor must have a comprehensive quality control programme. This programme must be documented. **The programme should address aspects such as:**

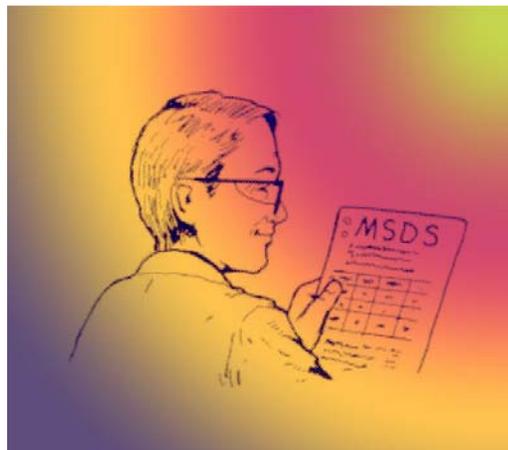
- Organization structure
- Quality assurance activities
- Procurement control
- Control of process
- Inspection activities
- Control of testing
- Audits, surveillance
- Corrective action

The following are points that the contractor should follow:

- Accumulation of hazardous waste on site shall not, under any circumstance, exceed two days.
- All shipments should be accompanied by a hazardous waste manifest.
- The contractor must coordinate with the local authority, such as Traffic Department, Municipality and Ministry of Health.
- The contractor must conduct a comprehensive training programme in hazardous waste handling, transporting and disposing for all of his employees. The training should be done twice yearly and the training programme should be approved by KFSH&RC.
- The contractor must provide a written contingency plan detailing the response to various types of emergency incidents, including spills.
- The contractor must perform regular employee physical examinations
- The contractor must post a 24 hour emergency telephone number in vehicles.

C. MATERIAL SAFETY DATA SHEETS (MSDS)

MSDS are the cornerstone of the hazard communication guidelines. They provide information about the chemical substances within a product, safe handling procedures, first aid measures and procedures to be taken when a product is accidentally spilled. The responsibility for preparing or maintaining MSDS lies with the chemical manufacturer. They must be provided to us from chemical distributors with the shipments and with the first shipment after MSDS is updated. All new information regarding certain chemical substances must be provided to us by the distributor.



We have available in laboratories, Research Centre, Nursing Units, EMS, Pharmacy, UMD, Environmental

Services, chemical storage (Warehouse #2) and the Safety Section volumes of MSDS for each chemical used in our Hospital. It is required that all departments using chemicals must maintain copies of the MSDS and ensure that they are readily accessible to employees during all work shifts.

All KFSH&RC staff who may be required to order chemical products should know that the manufacturer, importer or distributor of a chemical product must perform hazard assessment to determine the physical and health hazards of the material. They must also prepare a written document which is known as Material Safety Data Sheet, MSDS, that is designed to provide downstream users of the product with the names of the chemical constituents, the health effects it may be capable of producing and recommended precautions for its safe use. The MSDS, as we have emphasized before, must be sent to KFSH&RC user department with the shipment of material. **Appendix O.**

The MSDS includes the following information:

1. The identity or name of product must be the same on the label, MSDS and list of hazardous substances.
2. Both TLV and PEL must be shown on the MSDS.
3. The appearance and odour of a substance is indicated in the **Physical Data Section**.
4. Acute and chronic health effects are found in the **Health Hazards section** of an MSDS.
5. The flash point can be found in the **Fire and Explosion Hazards Data section**.
6. The stability of material is indicated in the **Reactivity Data section**.
7. Instructions for dealing with spill or leak and proper disposal methods are explained in the **Precautions for Safe Handling and Use section** of the MSDS.
8. Handling and storage information is described in the **Precautions for Safe Handling and Use section**.
9. Personal protective equipment, PPE, or engineering control measures are specified in the **Control Measures section**. Letter designations for PPE follow:
10. Letter designation for PPE follows:
 - A. **Safety Glasses**
 - B. **Safety Glasses, Gloves**
 - C. **Safety Glasses, Gloves, Apron**
 - D. **Face Shield, Gloves, Apron**
 - E. **Safety Glasses, Gloves, Dust Respirator**
 - F. **Safety Glasses, Gloves, Apron, Dust Respirator**
 - G. **Safety Glasses, Gloves, Vapour Respirator**
 - H. **Splash Goggles, Gloves, Apron, Vapour Respirator**
 - I. **Safety glasses, Gloves, Dust and Vapour Respirator**
 - J. **Splash Goggles, Gloves, Apron, Dust and Vapour Respirator**
 - K. **Air Line, Hood or Mask, Gloves, Full Suit, Boots**
 - L. **Ask your supervisor / Safety Officer for guidance.**

WHAT PPE CAN DO FOR YOU:



**WHAT PPE CAN DO FOR YOU:
PPE CAN'T PROTECT YOU UNLESS
YOU WEAR IT!**

إتبع الخطوات التالية



FIRE? YOUR ACTIONS EASY AS

RESCUE

evacuate those in
immediate danger

إخلاء

إخلاء الأشخاص
المعرضين للخطر

NOTIFY

alert others

Call 2

إتصل

إتصل ٢٢٢٢
شغل جرس الإنذار

CONTROL

use fire extinguisher
close doors

إطفاء

استخدم طفاية الحريق
إذا أمكن

إغلق الأبواب