CHEMICAL HAZARDS

CONTENTS

Overview

Chemical hazards come in a variety of forms. Some chemicals are toxic or corrosive in nature; others are unstable when exposed to certain compounds or conditions; still others are carcinogenic or mutagenic. Most of the chemicals used in schools do not pose serious dangers. However, there are some chemicals that require more careful handling or specialized equipment, and others that should be avoided altogether. In case a spill does occur, it is also important to know proper clean-up procedures.

Before working with any chemical, particularly controlled or hazardous substances, teachers and students should be thoroughly familiar with the risks associated with that product. Where possible, control chemical hazards by limiting chemical concentration and exposure.

Keep in mind that "the dose makes the poison"; in other words, the greater the concentration of a chemical, the greater the hazard.

General safety measures

The following general guidelines can be followed to increase the margin of safety when working with chemicals:

- Ensure that all chemicals are appropriately labelled and the MSDSs are readily available.
- Minimize exposure.
- Ensure that the acquisition, usage and storage is based on real needs: if safer alternatives exist, use them.
- Do not handle or use hazardous chemicals unless you are WHMIS trained.
- Only engage WHMIS trained staff to handle and use hazardous chemicals.
- Review the MSDS to determine potential hazards before using any chemical.
- Inform students of hazards and the necessary safety precautions.
- Never underestimate risks when mixing, storing or disposing of chemicals.
- Be prepared for incidents.
- Ensure proper labelling of all chemicals and chemical wastes.
- Do not keep stock bottles in the laboratory or in the fume hoods.
- Store chemicals in minimum quantities and in lower concentrations, and
- Do not use toxic materials unless there is adequate protection from exposure.

Occupational Health and Safety requirements

All staff must be aware of the requirements surrounding the handling, usage, storage, production or disposal of any chemical substance listed in Tables 19, 20 and 21 of the *OHS Regulations, 1996* Appendix.

Substances listed in Table 19 require the employer to provide the director of OHS written notice of any current or intended handling, use, storage, production, distribution or disposal of any chemical or biological agent listed in Table 19. The director must give written permission for the school to use the substances listed in Table 19. The director may also specify additional conditions that must be met in order for the teacher to use the chemical or biological substance.

Table 20 substances can only be used in laboratories that have adequate engineering controls (local ventilation) to prevent the release of the substance into the workplace. Alternatively, personal protective equipment and other control measures must be implemented to prevent any significant risk to workers from the substance.

For further information on this requirement, refer to sections 305, 306, and 307 as well as Tables 19 - 21 of the *OHS Regulations, 1996*.

Material Safety Data Sheets

MSDSs give detailed information about chemical composition, reactivity and health effects, as well as what protective equipment, safety and emergency procedures should be used. However, MSDSs do not include all the information that teachers will ever need to know about a particular chemical. Other resources should be consulted for hazard information on a specific application or process used in the laboratory. These sheets must be prepared by the product supplier and provided to the user (in this case the school), for all controlled chemicals. Suppliers may also be asked for MSDSs for other chemicals they supply. The MSDSs supplied by a chemical supply company are the legal source of information for those chemicals in case of an incident. In addition to the MSDSs supplied by chemical supply companies on order of chemicals, a variety of sources are available online at http://www.ilpi.com/msds/index.html. Unfortunately, some sites listed have limited access, particularly for print-outs. A website with an extensive listing of chemicals and a number of companies from whom MSDSs can be obtained is available at http://www.msdssolutions.com.

For a MSDS sample, see **Appendix 14**.

MSDSs are an essential source of information about chemical hazards, so it is important that teachers and students understand the sheets from a variety of suppliers. Although the numbering of sections and the order of appearance may differ from supplier to supplier, the following information must be on each MSDS:

1. **Product identification and use**:
    - Manufacturer's name.
    - Supplier's name, and
    - Emergency phone number.

2. **Hazardous ingredients**:
    - Chemical name of ingredients, and
    - Chemical concentrations.
3. **Physical data**:
    - Colour, form, solubility.
    - Melting and boiling points, and
    - Vapour pressure, specific gravity.
4. **Fire and explosion data**:
    - Flammability.
    - Flashpoint, and
    - Fire extinguishing type.
5. **Reactivity data**:
    - Stability and hazards, and
    - Special storage conditions.
6. **Toxicological properties**:
    - Threshold Limit Values (TLV).
    - Effects of exposure and exposure routes, and
    - Acute and chronic health effects.
7. **Preventative measures**:
    - Protective clothing.
    - Protective equipment, and
    - Spill and handling procedures.
8. **First aid measures**:
    - Emergency exposure procedures.
9. **Preparation information**:
    - Date of MSDS, and
    - Contact information for the preparer of the MSDS.

MSDSs are dated and expire at the end of a three-year period. MSDS updating is generally done at the same time that the chemical inventory is updated. As per *OHS Regulation, 1996* section 327, official MSDSs can be filed in hard copy form or on a computer, as long as they are readily available to all staff using these chemicals. For more information, see **Chapter 8 Chemical Management**.

MSDSs do not include all the information that teachers will ever need to know about a particular chemical.

Toxic and corrosive chemicals

Toxic or corrosive properties are the most common hazards posed by chemicals in schools (see the **Chapter 9 Chemical hazard information table** link for information about specific chemicals). A toxic substance is any substance that may cause damage by its chemical action when ingested, inhaled, absorbed or injected into the body in relatively small amounts. Damage can occur when materials:

- Directly destroy tissue through corrosive action.
  - For example, NaOH reacts with moisture in the skin.
- Interfere with chemical reactions of the body.
  - For example, CO replaces O_2 in hemoglobin,
- Disrupt the biological processes of the body.
  - For example, NO_2 causes pulmonary edema and allergic responses.

Exposure to toxic materials

Toxic materials can enter the body via:

- **Inhalation** – breathing in poisonous or corrosive vapours and dust. It is the most common route of bodily entry.
- **Ingestion** – swallowing liquid or solid toxic materials.
- **Direct entry** – chemicals entering the body through open wounds or through directly injecting chemicals, providing access to the bloodstream, or
- **Contact** – absorbing toxic materials through skin, mucous membrane or eyes.

Since inhalation of vapours or dust is the most common way that toxic materials enter the body, every effort should be made to avoid circumstances that allow this to happen. Any activities that involve use of toxic materials in liquid, vapour or dust form should only be carried out under a fume hood.

Effects of toxic chemicals

Toxic effects can be local or systemic, acute or chronic. Local effects are confined to the area of the body that has come in contact with toxic materials; systemic effects occur throughout the body after absorption into the bloodstream. Acute effects can occur immediately, or hours to days after an exposure and are usually extremely serious or painful. With chemicals that can produce acute effects, poisoning may be suspected when any of the following is evident:

- Strange odour on breath.
- Discolouration of lips and mouth.
- Pain or burning sensation of throat, or
- Unconsciousness, confusion or sudden illness.

By comparison, chronic effects are long lasting and may take many years before becoming evident. Many substances, such as arsenic and mercury, have cumulative effects, meaning that poisoning may occur at lower concentrations through repeated exposures over time. Such substances are sometimes known as insidious hazards.

Insidious substances include carcinogens, teratogens and mutagens. Carcinogens cause cancer in cells. Teratogens interrupt or alter the normal development of a fetus. These include chemicals such as ethanol and mercury compounds, viruses such as rubella, and ionizing radiation. Mutagens increase the rate of cell or organism mutation, and include chemicals such as nitrous acid, peroxides and dichromates, as well as certain viruses and radiation.

Insidious hazards

The most obvious source of insidious chemical hazards is from substances known to have dangerous long-term effects, such as mercury and carcinogens. These substances can cause damage through direct exposure or through leakage of vapours or fumes from chemical containers. However, even if such chemicals are not intentionally ordered and stored in the schools, insidious hazards can still exist and be easily overlooked.

Insidious hazards include:

- Leaking gas cylinders.
- Formaldehyde from biological specimens (if these are still around).
- Mixed chemicals that slowly react to form toxic products, particularly mixtures of waste materials.
- Neglected containers of dried solutions and residues of previously used chemical products, and
- Residue from chemicals improperly disposed of in the sink drain; improper disposal may result in subsequent interactions that cause the formation and release of toxic or other hazardous materials into the laboratory air (for chemicals that can be safely disposed of down the drain, see the **Chapter 9 Chemical hazard information table** link.

Insidious hazards could be easily overlooked or ignored, even during safety inspections because they do not have immediately obvious effects. To avoid or reduce these kinds of hazards, consider the following measures:

- Give specific attention to possible sources of insidious hazards during the safety inspection process.
- Prepare an inventory of insidious hazards that must be tended to regularly.
- Provide adequate ventilation in the form of hoods and forced air, as stated in current standards and codes.
- Avoid stock build-up of toxic, flammable or corrosive materials.
- Keep appropriate clean-up agents and spill kits accessible in case of spills.
- Collect waste materials in separate containers and do not mix them, and
- Perform diligent and regular housekeeping.

Mercury

One hazardous substance that may be present in schools is mercury. It can have serious and cumulative effects on the gastrointestinal and central nervous systems. Anyone who is pregnant or nursing should take extra precautions to prevent mercury exposure. Open mercury evaporates and readily absorbs through the skin and respiratory system. Disposal of mercury and mercury compounds is also a major concern.

Sweeping of mercury spills must be prohibited; spills must be cleaned up promptly and thoroughly or dangerous exposure to vapours will continue.

Given the hazards of mercury, it is not recommended for use in Saskatchewan schools. Mercury thermometers should no longer be used in schools because of potential breakages and spills. If mercury is still in stock, the following steps need to be taken to manage it more safely:

- Store mercury in labelled plastic bottles under a layer of water or oil.
- Keep the container sealed in a cool, well-ventilated area.
- Avoid opening the container and allowing vapours to escape, and
- Wear gloves when handling containers.

Mercury spills from thermometers, thermostats or any other source must be cleaned up immediately and thoroughly, regardless of the size of the spill. Unless spills are promptly and thoroughly cleaned up and the area decontaminated, dangerous exposure to vapours will continue.

The following steps are recommended if the amount spilled is less or similar to the amount in a thermometer:

1. Air out the room. Where possible, open window or shut off the central forced-air system and leave the room for 15 minutes or more.
2. Have everyone leave the room, and do not allow anyone to walk through the breakage area.
3. Remove all jewelry from hands and wrists so the mercury does not combine (amalgamate) with the precious metals.
4. Put on rubber or nitrile gloves, goggles or safety glasses, an appropriate respirator, and disposable booties.
5. Carefully scoop up glass pieces and powder using stiff paper or cardboard and put on a paper towel or plastic dust pan. Put in an unbreakable container or bag and secure. Avoid using glass.
6. Locate visible beads. Use a squeegee or cardboard to gather mercury beads, brooms or brushes must not be used. Mercury should be moved from the outside of the spill zone towards the center using the cardboard or squeegee. Use slow sweeping motions to keep mercury from becoming incontrollable.
7. Take a flashlight, hold it at a low angle close to the floor in a darkened room and look for additional glistening beads of mercury that may be sticking to the surface or in small cracked areas of the surface. **NOTE**: mercury can move surprising distances on hard-flat surfaces, so be sure to inspect the entire room.

8. For larger beads, use an eyedropper to collect or draw up the mercury beads. Slowly and carefully drop onto a damp paper towel. Place the paper towel in a bag (such as a zip lock) and secure.
9. For smaller beads, use duct tape or packing tape to collect them off the surface.
10. Place all materials used with the cleanup, including gloves, in a trash bag. Secure the bag and label it for chemical disposal.
11. Optional: there are commercially available powdered sulphur products that absorb beads too small to see. This powder is sometimes available in a mercury spill kit. Follow the instructions for using powder, and ensure you wear the personal protective equipment recommended on the package.
12. Clothing that mercury has been directly spilled on must be bagged and labelled for chemical disposal. However, the clothing you are wearing during a clean-up that has only been exposed to the mercury vapour can be washed as normal.
13. Mercury may have seeped into porous surfaces and be impossible to remove. If this is the case, seal with epoxy paint or another sealing agent.
14. Continue to ventilate the area with outside air using fans for a minimum of two days if possible. In an office building, increase the air exchange rate for one day.

Mercury droplets from 10 to 1000 micrometres in diameter also stick to vertical surfaces and penetrate into porous flooring. In some cases, relatively large amounts of mercury may be left undiscovered after spills. Prompt and thorough clean-up of mercury spills is essential as cumulative exposure to mercury vapours can cause irreparable harm to those working in the area.

In Saskatchewan, the clean-up procedures for mercury spills in schools are determined by local school divisions. Some divisions may permit school staff to clean-up spills using mercury spill kits, while others specifically restrict clean-up to professionals such as those at EnviroHazmat Inc. Check your school division's policy on mercury spill clean-up before proceeding with the actual process. If division policy allows staff to clean-up, use a mercury spill kit that includes components to control vapours; such components would include an aspirator, mercury absorbent, vapour absorbent and specific personal protective equipment.

Carcinogens

A carcinogen is a chemical, physical or biological substance that is capable of causing cancer. The damaging effects are subtle and imperceptible in the short term, thus carcinogenic substances are another insidious hazard that may be present in the laboratory and chemical storage area. A substance is considered to be carcinogenic if it has been evaluated and rated as a human carcinogen, an animal carcinogen or a potential carcinogen by the American Conference of Government Industrial Hygienists or the International Agency of Research on Cancer. These substances will also be categorized under WHMIS as Class D2.

Health Canada has tabled a list of substances assessed for carcinogenicity on its website at: http://www.hc-sc.gc.ca/ewh-semt/occup-travail/whmis-simdut/carcinogenesis-carcinogenese-eng.php

Health Canada lists chemicals that have been tested and found to be carcinogenic. Many chemicals have not been tested and are not listed. Do not assume that omission means the chemical does not pose any risk.

The website also has links to agencies to enable searches of the most current information. Carcinogenic properties are also indicated in the link in **Chapter 9 Chemical hazard information table**.

Actual manifestation of cancer or tumors for most carcinogenic chemicals requires prolonged and often relatively constant exposure. Proper storage of such chemicals in airtight containers reduces this hazard by limiting exposure only to periods of chemical usage. However, the more frequent the use, the greater the exposure, particularly for powdered forms of these chemicals, which can be absorbed through the skin and lungs.

Fewer chemicals have carcinogenic properties compared to other risks, and those that do should be avoided, if possible. Whether to stock and use chemicals with carcinogenic properties will depend on curricular requirements, adequacy of facilities and the ability to safely handle these chemicals with the frequency required. Serious consideration should be given to using alternative chemicals whenever possible.

Corrosive substances

Corrosive chemicals cause burns or tissue destruction at the site of contact and can cause effects such as permanent scarring or blindness. This corrosive quality is often due to the substance reacting with water or moisture in the tissue. This is the case with strong acids and bases of 1M or greater concentration, non-metal halides, dehydrating agents, halogens and oxidizing agents. The most serious corrosion hazards come with substances that are in a mist or gaseous state, since they can be readily absorbed through the skin or inhaled into the lungs.

The corrosive properties of chemicals commonly found in schools are identified and discussed in **Chapter 9 Chemical hazard information table**.

Minimizing risks of toxic and corrosive chemicals

Whenever chemicals are used, the onus is on the teacher to assess risks, determine proper handling procedures and convey this information to students before beginning the activity. Handling procedures used for all chemicals, and especially those with greater hazards, should aim to minimize exposure. This can be accomplished through strategies such as the following:

- Do not handle hazardous materials in open containers because vapours, dust and liquids can easily escape during normal handling.
- Do not heat hazardous materials because smoke and vapour may be released in much greater quantity when material is hot.
- Avoid creating dust by crushing or grinding solids or unnecessarily transferring powders.

- Only use and store hazardous materials in areas with adequate ventilation. Toxic vapours can rapidly accumulate to dangerous levels in a room, or part of a room, that does not have a constant replacement of fresh air.
- Do not lean over open bottles because toxic vapours can be concentrated directly above the bottle even in well-ventilated rooms.
- Ensure chemicals are clearly labeled and check these labels every time a substance is used. Odour and appearance are not reliable guides to the toxicity of substances; dangerous liquids can be clear and odourless, and toxic vapours may have little or no odour, even at dangerous concentration levels.
- Use appropriate personal protective equipment such as correct clothing, face protection, fume hoods or respirators to prevent skin contact with hazardous materials and inhalation of toxic vapours.
- Do not chew gum, smoke, or store or consume food or beverages in an area where hazardous materials are used. Food, beverages, gum and cigarettes can easily absorb hazardous vapours or be contaminated with unseen toxic dust. Poisons may also be transferred from hands to food or cigarettes.
- Follow proper clean-up procedures after each lab activity is finished. Substances left on benches, in beakers or bottles may expose others to these toxic materials, and
- Ensure students wash their hands thoroughly after activities to avoid transferring toxic materials to food they eat.

Other Chemical Hazards

Cryogenic Substances (liquefied/solidified gases)

Cryogenic substances are gases that are maintained at extremely low temperatures in liquid or solid form. The most common cryogens that are readily available to schools are solid carbon dioxide (dry ice) and liquid forms of hydrogen, oxygen, methane and nitrogen.

Cryogens pose several serious hazards. These include:

- **Explosive Pressure**. Cryogenic gas generates enormous pressure when vapourized within the container and when released through the valve. Do not obstruct pressure relief valves on storage containers and inspect regularly to ensure they function as intended. In the case of methane gas, for example, the expansion is 630 times that of the equivalent liquid volume.
- **Fire**. Flammable cryogenic substances present the same flammability hazard as their gaseous forms.
- **Embrittlement** of structural materials and human tissues. Most materials experience some degree of embrittlement at temperatures below -50°C. Contact with cryogenic liquids, their gases or the surfaces of their containers can lead to frostbite or more extensive freezing of tissue which can be very destructive. Living tissue can become completely frozen and so brittle that it will shatter on impact, and
- **Asphyxiation**. Except for liquid oxygen, expansion of cryogens may displace a sufficient volume of air to cause asphyxiation. This is particularly true of dry ice, which sublimes into carbon dioxide gas and readily displaces normal air since it is heavier than other atmospheric gases.

The use of cryogenic compounds is covered under *OHS Regulations, 1996*, section 371 – "compressed and liquefied gas systems." This regulation requires safe work procedures to be developed and implementation for the safe installation, use and maintenance of these systems.

Only personnel with the necessary expertise and appropriate administrative approval should handle compressed gases or cryogenic substances, including dry ice. Use by students is not recommended.

Anyone choosing to use cryogens should have a thorough knowledge of the characteristics of the substance at the temperatures and pressures being used, and the appropriate safety precautions for handling. They should also know how to recognize and eliminate leaks, and the requirements for short- and long-term storage.

To minimize risks, it is important to take every possible precaution, including the following:

- Only use cryogens in a properly ventilated space to avoid a build-up of gas that may cause fire, explosion or asphyxiation. Adequate ventilation is particularly important to prevent asphyxiation with the use of dry ice.
- Store containers of cryogenics in a cool, well-ventilated space, in an upright secured position, and vent containers properly or ensure pressure relieving valves are functioning to avoid explosion. Prolonged storage in a poorly ventilated area will cause metal valves to undergo chemical corrosion. If this occurs, store in a separate, cool, dry room away from direct sunlight and sources of sparks or flame.
- Ensure warning signs and the name of the cryogen are all posted in locations where the substance is stored or used.
- Ensure vessels are appropriately labelled and filled only with the liquids they were designed to hold.
- Perform operations slowly to minimize boiling and splashing.
- If liquid nitrogen is heavily contaminated with oxygen, handle it with precautions suitable for liquid oxygen. The appearance of a blue tint in liquid nitrogen is a direct indication of oxygen contamination.
- Take appropriate precautions when releasing cryogenic gases. If oxygen is used, remember that it does not burn but it does enhance burning of flammable materials. Thus, open flames or sources of sparks should be removed from the area.
- Ensure that all eyes are protected and all skin is covered by wearing goggles, a face shield, pants and boots, a laboratory coat or apron without pockets or cuffs, and loose-fitting gloves that protect against frost-bite and can be easily removed, and
- Remove watches, rings, bracelets and other jewelry.

Compressed gas

Cylinders of compressed gases should be handled and stored in a similar fashion to cryogenic substances. Ensure compressed gas cylinders (empty or full) are secured during transportation and use. Containers used to store gases should meet the NFPA standard, prescribed for both Canada and the United States. For more information, see sections 371 and 372 of the *OHS Regulations, 1996*.

Flammable substances

If minute amounts of flammable substances are provided for student use, make sure the area is well-ventilated and far from open flames or sparks. Identify and eliminate any unwanted ignition sources that may exist, such as sparks that come with unplugging electrical cords and static electricity. Teacher demonstrations using flammable substances can be done under similar conditions or under the fume hood.

Substances that are highly flammable or volatile should not be used by students.

Again, cabinets and containers used to store gases should meet the NFPA standard, which is relevant both in Canada and the United States. Section 314 of the *OHS Regulations, 1996* requires flammable substances to be stored separately from incompatible materials and stored in a well ventilated area that is protected from excess temperature. Moreover, section 365 requires combustible or flammable liquid receptacles meet the *National Fire Code of Canada, 1990* requirements. Refer to **Chapter 8 Chemical storage** for more information.

Explosive substances

Concentrated forms of unstable substances that have the potential to explode pose too great a risk to warrant use and should not be kept in schools. Some explosive substances in lower concentrations, such as hydrogen peroxide, are relatively safe. For more information on explosive substances, refer to this group on the table in **Chapter 9 Reactive nature of chemicals**.

Managing the release or spill of toxic or corrosive substances

Deciding how to handle a spill first requires understanding all the hazards associated with the substance. There are three immediate questions that must be answered:

1. Is this substance highly toxic or corrosive?
2. Does it give off toxic or corrosive fumes?
3. Are the fumes potentially explosive?

Answers to these questions can be found in the MSDSs that must be accessible to users at all times, and be reviewed before commencing activities with the materials. For substances that are highly toxic or corrosive (ones that have a health rating of three or four) any spills and releases of these substances must be handled by specially trained professionals who are equipped to deal with such emergencies. This may require evacuation of the school, particularly if toxic fumes are associated with the substance. See **Chapter 2** for emergency procedures.

In the case of spills of acids and bases, local action by knowledgeable staff can be taken to neutralize the spill using materials prepared for that purpose. Once neutralized, the products can be cleaned up and disposed.

Prompt clean-up is also the appropriate measure to deal with manageable quantities of other materials that are not highly toxic or corrosive. All wastes resulting from these cleanups should be contained separately.

CAUTION: placing all spilled or waste chemicals in a general waste bin may result in reactions with other chemicals or wastes placed in the bin.

Corrosive liquids

Less serious spills of corrosive liquids can be handled using the following steps:

1. Put on protective clothing/equipment (face shield, appropriate respirator, rubber gloves, rubber boots and lab coat) if the spill is concentrated.
2. Contain the spill with asbestos-free vermiculite, clay cat litter (bentonite) or diatomaceous earth.
3. Neutralize the substance. For acids, liberally apply sodium bicarbonate (baking soda) or sodium carbonate (soda ash), or apply a spill kit pillow. For bases, sprinkle boric acid or citric acid on the spill, or apply a spill kit pillow. Test with pH paper to ensure the substance is completely neutralized.
4. Dilute with plenty of water and mop up using an absorbent cloth, and
5. Wash contents down the sink and clean spill area with water. Wipe dry with paper towels.

Flammable liquids

Municipal bylaws and waste regulations may permit some substances to be disposed of through drains. If permitted in your area, wash the material down with plenty of water. Alternatively, absorbent materials (asbestos-free vermiculite or diatomaceous earth) may be used to soak up the solution. The resulting mixture can then be bagged, labelled and sent for disposal.

Small amounts of solvents can be cleaned up as follows.

1. Immediately shut off all ignition sources, and open windows and vents leading directly to the outside for ventilation.
2. Contain and cover the spill with a mineral absorbent such as asbestos-free vermiculite, bentonite or diatomaceous earth.
3. Scoop the contaminated absorbent into a non combustible receptacle that has a close fitting metal cover. This container must also be labelled as flammable (s. 364 of the *OHS Regulations, 1996*).
4. Wash the spill area with soap, water, and a disposable cloth, and
5. Dispose of the contaminated cloth in the non-combustible receptacle.

Other liquids (excluding mercury)

Water-soluble liquids

1. If necessary, contain with towels, asbestos-free vermiculite, bentonite or diatomaceous earth.
2. Dilute with water.
3. Mop up using paper towels or cloths. Very small spills can be swabbed directly into a sink and flushed with large volumes of water, and
4. Check **Chapter 9 Chemical hazard information table** link and the MSDS for final disposal details.

Water-insoluble liquids

1. If necessary, contain with towels, asbestos-free vermiculite, bentonite or diatomaceous earth.
2. Cover the spill with mineral absorbent and scoop the contaminated material into a suitable container for disposal.
3. Wash the spill area with water and soap and wipe dry with paper towels, and
4. Discard contaminated towels or cloth. Check **Chapter 9 Chemical hazard information table** link and the MSDS for final disposal details.

Solids

The critical factor in cleaning up solid chemicals is to avoid raising particles into the air and inhaling them. Dust generation is likely to occur and a N95 respirator should be worn.

1. Slowly sweep up granules or powder into a dustpan.
2. Mop up smaller amounts with a damp disposable cloth.
3. Wipe the area clean, and
4. Determine appropriate disposal procedures from **Chapter 9 Chemical hazard information table** link and the MSDS.