Material Safety Data Sheets

Federal law requires that manufacturers and distributors of chemicals provide users with Material Safety Data Sheets (MSDSs), which are designed to provide the information needed to protect users from any hazards that may be associated with the product.

As the first step in a risk assessment, laboratory workers should examine their plan for a proposed experiment and examine the MSDS for each chemical they will be working with or producing.

MSDSs are concise technical documents, generally two to five pages in length. An MSDS typically begins with a compilation of data on the physical, chemical, and toxicological properties of the substance and then provides generally concise suggestions for handling, storage, and disposal. Finally, emergency and first aid procedures are usually outlined. At present there is no required format for an MSDS; however, it is expected that the Occupational Safety and Health Administration (OSHA) will soon adopt a general 16-part format proposed by the American National Standards Institute (ANSI).

The following is a guide to the information typically found in an MSDS:

1. Name of supplier (with address and phone number) and date MSDS was prepared or revised. MSDSs should be reviewed periodically to check that they contain up-to-date information. Name of the chemical. For products that are mixtures, this section may include the identity of most but not every ingredient. Common synonyms are usually listed.
2. Physical and chemical properties. Data such as melting point, boiling point, and molecular weight are included here.
3. Physical hazards. This section provides data related to flammability, reactivity, and explosibility hazards.
4. Toxicity data. OSHA and American Conference of Governmental Industrial Hygienists (ACGIH) exposure limits are listed.
5. Health hazards. Acute and chronic health hazards are listed, together with the signs and symptoms of exposure. The primary routes of entry of the substance into the body must also be described. In addition, potential carcinogens are explicitly identified. In some MSDSs, this list of toxic effects is quite lengthy and may include every possible harmful effect the substance can have under the conditions of every conceivable use.
6. **Storage and handling procedures.** This section usually consists of a list of precautions to be taken in handling and storing the material. Particular attention is devoted to listing appropriate control measures, such as the use of engineering controls and personal protective equipment necessary to prevent harmful exposures.

7. **Emergency and first aid procedures.** This section usually includes recommendations for firefighting procedures, first aid treatment, and steps to be taken if the material is released or spilled. **Disposal considerations.** Many MSDSs provide guidelines for the proper disposal of waste material.

8. **Transportation information.** It is important to remember that this chapter is concerned only with evaluating the hazards and assessing the risks associated with chemicals in the context of laboratory use. MSDSs, in contrast, must address the hazards associated with chemicals in all possible situations, including industrial manufacturing operations and large-scale transportation accidents. For this reason, some of the information in an MSDS may not be relevant to the handling and use of that chemical in a laboratory. For example, most MSDSs stipulate that self-contained breathing apparatus and heavy rubber gloves and boots be worn in cleaning up spills, even of relatively nontoxic materials such as acetone. Such precautions, however, might be unnecessary in the case of laboratory-scale spills of acetone and other substances of low toxicity.

**Limitations of MSDSs**

MSDSs remain the best single source of information for the purpose of evaluating the hazards and assessing the risks of chemical substances. However, laboratory workers should recognize the limitations of MSDSs as applied to laboratory-scale operations:

1. The quality of MSDSs produced by different chemical suppliers varies widely.
2. MSDSs must describe control measures and precautions for work on a variety of scales, ranging from microscale laboratory experiments to large manufacturing operations. Some procedures outlined in an MSDS may therefore be unnecessary or inappropriate for laboratory-scale work.
3. Many MSDSs comprehensively list all conceivable health hazards associated with a substance without differentiating which are most significant and which are most likely to actually be encountered.

**Labels**

Commercial suppliers are required by law to provide their chemicals in containers affixed with precautionary labels. Labels usually present concise and nontechnical summaries of the principal hazards associated with their contents. Note that precautionary labels should not replace MSDSs as the primary source of information for risk assessment in the laboratory.
Labels on the bottles of chemicals, including squeeze bottles, should conform to the voluntary ANSI Standard for Hazardous Industrial Chemical – Precautionary Labeling, Z129.1. This standard requires that every label contain:

1. the name of the chemical that is in the labeled container
2. one of three signal words: Danger, Warning, or Caution to indicate the relative degree of severity of the hazards of the chemical
3. the principal foreseeable hazards the chemical presents when used in the industrial workplace
4. the precautionary measures that will protect users from the harmful effects of those hazards
5. first aid instructions if the measures described could mitigate or prevent further serious injury before professional medical assistance is available
6. instructions in case of fire, if applicable
7. methods to handle spill or leaks, if appropriate
8. instruction if the chemical requires unusual handling and storage procedures
9. the name, address and telephone number of the manufacturer or supplier.

**Laboratory Hardware and You: The Interface**

Fatigue and hunger increase your risk of injury in the lab. Plan ahead so you are at your best in the lab.

Taking drugs, including medication and alcohol, may also make it inadvisable to work in the lab. If a medication says do not operate heavy equipment you probably should not drive a car or work in the lab.

All read the instructions provided from the manufacturer for the correct operation of equipment. Routine maintenance should be done on all lab equipment. Check for frayed cords, cracked or chipped glass, etc. Maintenance should be done correctly – contact the manufacturer if you are uncertain about the correct way to do a repair. Don’t use equipment for any purpose other than the one it was intended for. Equipment should also be used in the correct environment.