

# Appendix

# E

## Biology Department Safety Manual

### I. Responsibilities

Safety is a fundamental responsibility of all laboratory users. This manual serves as a basic safety guide for the Schaefer Hall biology laboratories. You may also wish to refer to the St. Mary's College of Maryland Chemical Hygiene and Laboratory Safety Plan, located on the departmental website; it addresses safety campus-wide and gives detailed information for faculty and staff as well as students.

#### Faculty

St. Mary's College faculty are responsible for instructing students and other laboratory workers about safe procedures, and for setting good examples by their own laboratory behavior. Laboratory instructors should obtain MSDSs (*see below*) for substances with particular hazards, and should make them available to those who work in their laboratories. The faculty also have some responsibility for ensuring that students actually understand and practice laboratory safety. Some ways in which they can carry out this responsibility might include:

- putting safety questions on tests and examinations (including practicals)
- observing students' behavior and making appropriate comments
- inspecting the laboratory spaces periodically
- ejecting recalcitrant offenders from the laboratory

#### Students

The primary responsibility for safe laboratory practices unavoidably rests with the individual laboratory practitioners: the students. Students must follow the

procedures as they are instructed, understand the rules and the reasons for them, and pass examinations on safety procedures.

Obviously, it is not a good practice to have people in the laboratory who are unfamiliar with lab safety practices. When visitors must be present (for example, when a student would otherwise be alone in the lab), their hosts should instruct visitors about the most basic safety practices (*e.g.*, proper clothing, locations of telephones and exits) and ask them not to participate in activities that might expose them to hazards.

The Code of Federal Regulation 1910.1200 Hazard Communication federal “right to know” law requires employers to disclose the possible dangers involved in handling hazardous materials. These hazards, and proper handling measures to reduce them, are outlined in Material Safety Data Sheets or MSDSs. MSDSs for all substances that a worker might contact must, by law, be available in a readily accessible place, and workers must be allowed time to read them. This law does not apply to students taking classes or doing research because they are not employees of the College (it does, obviously, apply to student workers), but we have elected to make MSDSs available to students anyway. The MSDSs are available in the central stockroom, SH 116, on the first floor, west wing, of Schaefer Hall. There is also a binder with relevant MSDSs on the shelf at the back of the POB lab.

There is a sample MSDS at the end of this section of the Safety Manual. Below is a brief description of each of the parts of the sheet:

Product name, manufacturer’s address and emergency phone number.

- Hazardous ingredients, common name(s) and any synonyms or other ways of designating the product. The only time this section will be blank is when the product is protected as a trade secret (hazards and safety measures would of course still be listed).
- Health hazard data. These are data on potential modes of physical entry, acute and chronic effects of exposure, signs and symptoms, first aid, and carcinogenic, mutagenic or other specific hazards.

## **Visitors and others**

## **Right to know and MSDSs**

- Normal physical and chemical characteristics, such as normal appearance and odor, boiling/vaporization and melting points, solubilities, specific gravity and density.
- Fire and explosion hazard data. This includes the product's flash point (if it has one), ignition data, and special requirements for extinguishing fires.
- Reactivity data. This includes stability, incompatibilities, hazardous decomposition products or byproducts, hazardous polymerization reactions, and any conditions to avoid.
- Precautions for safe handling and use of the product, including all safe storage and disposal precautions and information.
- Measures for self protection, such as gloves and other safety clothing, respirators and ventilation requirements, eye protection, and any other hygiene recommendations.

We will try to put some of the information from the MSDSs in laboratory instructions or provide the MSDSs themselves when a laboratory exercise uses chemicals with particularly dangerous or unusual safety-related properties (*e.g.*, high flammability, toxicity), and the instructor will usually emphasize the proper precautions. However, the fundamental responsibility for knowing the safety-related properties of laboratory materials is the user's. Such properties are always fair game for examination questions! Bottom line: **Read the MSDSs.**

## Special Regulations

There are special federal and state regulations relating to the use of living animals (especially vertebrates), human subjects (other than one's self), and some other materials and procedures. Students may not do any of these procedures without first discussing the matter thoroughly with, and obtaining explicit permission from, a faculty member. For information only, we summarize a few of these regulations in part V, Special Safety Situations; the summary is not adequately detailed to use as a guide to proper procedures.

Faculty and lab instructors may provide additional safety guidelines or instructions in their syllabi, or as written or oral instructions presented in the laboratory. Students are responsible for understanding and following the safety guidelines recommended by their instructor.

**Eating and drinking:** Do not eat or drink in laboratory work areas. Handling food from bench to mouth is a route of exposure for bacteria and certain toxic materials. Prepare solutions ingested for physiology laboratories in virgin glassware and plasticware. Food is not permitted in laboratory refrigerators, ice chests, cold rooms or technical work areas.

**Smoking:** There is no smoking allowed inside Schaefer Hall.

**Cosmetics:** Application of cosmetics in the laboratory work area is prohibited.

**Contact Lenses and Face Protection:** Contact lenses may absorb certain solvents and constitute a hazard in splashes or spills since they offer no protection from a splash and may concentrate caustic material against the cornea or prevent tears from washing a caustic away. You are strongly advised not to wear contacts in the laboratory. Wear face shields or eye protectors when handling caustic materials.

**Clothing:** Confine loose clothing in the laboratory. If it is worn, it must be covered by a lab coat. Clothing that covers most of your body (i.e., pants instead of shorts) is preferable. Shirts are required. Gloves, goggles, or safety glasses are recommended. If circumstances require an exception to this, your professor will let you know.

**Shoes:** Wear shoes at all times in the laboratory and throughout the science building. Ideally, shoes should be comfortable, rubber soled, and cover the entire foot (i.e., sandals or shoes with open toes are not recommended). If circumstances require an exception to this, your professor will let you know.

**Hair:** Secure your hair back and off your shoulders to prevent it from coming into contact with contaminated materials, surfaces, or Bunsen burners.

## II. Working in the Laboratory

### A. Proper laboratory practices

**Hand Washing:** Wash your hands frequently, and always wash them before leaving the laboratory.

**Mouth Pipetting:** Never pipette by mouth!

## **B. Laboratory Etiquette**

1. **The laboratory as a workplace**—A teaching or research laboratory is an exciting and potentially dangerous place. Students working in the laboratory need to act responsibly and safely at all times. Throwing objects, using wash bottles as squirt guns or any physical horseplay will not be tolerated. Any student found disregarding general lab rules or the safety of others will be asked to leave.
2. **Housekeeping**—Laboratory work areas should be kept clean and free from obstructions. Cleanup should follow the completion of any lab exercise. Leaving spilled unidentified chemicals in any form on lab bench surfaces poses an especially dangerous hazard to those who will use that space after you. Deposit wastes in appropriate receptacles. If you don't know how to dispose of them, you shouldn't be using them. Please check with your lab instructor or manual for appropriate guidelines for clean up and disposal of lab materials. Clean up spilled chemicals immediately and dispose of them properly. Refer to section III of this manual for further information.
3. **Glassware**—Do not use broken or chipped glassware. Dispose of broken glassware only in specially marked separate containers. Disposal of broken glass along with paper in the trash bins is especially hazardous to the custodial staff as well as others. Do not leave pipettes sticking out of bottles, flasks or beakers where they may be bumped or pushed over. Do not attempt to remove stoppers from glass tubing by forcing them through if they appear to be stuck. All hot glass, heated containers or items from the autoclave should be handled with special gloves. Do not heat sealed containers.
4. **Razor blades, needles and other sharp objects**—Any sharp objects other than glass should be disposed of in specially marked “sharps” containers. Never place these items in laboratory trash bins.

Use the personal protective equipment (PPE) appropriate to your task.

1. **Eye protection**- Wear glasses or goggles when working with most lab liquids, but especially when a splash could injure or infect your eye. Use EXTRA caution with:
  - a. highly caustic solutions—strong acids and bases
  - b. highly concentrated solutions
  - c. organic solvents- watch out for contact lenses which can absorb many chemicals
  - d. UV illumination—use UV blocking eye wear
  - e. animal body fluids or tissues
  - f. bio-hazardous material- bacteria, viruses
  - g. liquid nitrogen—use a full face shield
  - h. toxic powders that may become airborne (*e.g.*, when weighed)
  
2. **Gloves**—Wear gloves to protect your hands if something could be absorbed through your skin, especially if materials are:
  - a. caustic
  - b. concentrated
  - c. toxic
  - d. readily absorbed through the skin (*e.g.*, organic chemicals)
  - e. hot or cold
  - f. or could leave a long-lasting odor or discoloration even if they're harmless

Choose the correct glove for the type of materials you are handling. Glove compatibility charts are posted in most laboratories. Students should consult their lab instructor if they are unsure of what personal protective equipment should be worn.

3. **Use a hood for volatiles**—There is a special document, posted on each fume hood that you need to read BEFORE you use it. A good rule of thumb is to open the hood only far enough to perform your work. This creates positive air flow away from you and protects your body from possible flying things.
4. **Use all the protective devices available for your task**—Do not attempt to override or defeat:
  - a. alarms for over/under temperature, maximum voltage, low volume, *etc.*
  - b. circuit breakers that shut down equipment when the covers are removed

## III. Inside the Laboratory

### A. Personal Protective Equipment (PPE) and Protective Devices

- c. door interlocks on centrifuges or autoclaves

## B. Secondary Labeling

Reagent containers, microfuge tubes, flasks, *etc.* must be labeled with content, concentration, date received or prepared, storage requirements, and your name. Labeling for any hazardous materials must also include caution required, type of hazard, precautions for use, and instructions in case of accident.

## C. Special hazards

There are special hazards associated with some special procedures. Experienced faculty and staff members provide safety training to individuals who will use equipment or conduct procedures that are potentially hazardous. Safety training must be documented for all individuals. Be thoroughly trained before you attempt to use:

- centrifuges, especially high speed (see Section VI (A))
- autoclaves- do not use without supervision (see section IV ©)
- bottles of compressed gas- if used improperly they can act like bombs or torpedoes.
- electrophoresis equipment- high voltage and the danger of explosion if used improperly
- body fluids (blood, urine, tissues)
- any equipment that employs high pressure or high/low temperature

**Be alert—READ DIRECTIONS AND LABELS. Don't mix chemicals without prior knowledge and approval of your lab supervisor.**

## D. Safety Equipment

Know the location of the nearest exit and safety equipment wherever you are working.

1. **Fire extinguishers and telephones** are located in all hallways and teaching and research labs. Emergency phones and fire alarms located in the hallways connect directly to Public Safety.
2. **Emergency eyewashes** are located near at least one sink in each lab and prep area. In addition, floor-mounted eyewashes are also located in all teaching labs, except for the Plant Biology Laboratory, (SH108).
3. **Emergency showers** are located in laboratories on the second floor in the Microbiology/ Cell Biology Lab (SH 209) , the Genetics lab (SH246), and three faculty research labs (SH 211, SH 251 and SH 253.. In addition, each sink-mounted eyewash can be used as a

shower to flush the skin in the event of a chemical spill, if an emergency shower is not nearby. These eyewashes extend up to 5-feet from the sink by means of a flexible hose.

4. **First Aid Kits** are found in all teaching labs and prep labs. A burn kit is located in the Microbiology/Cell Biology Lab, SH 209.
5. **Fire Blankets** are located in the Central Stockroom (116), the Ecology/Geology Lab (112), the General Biology Lab (221), the Molecular/Genetics Lab (SH246), and the Microbiology/Cell Biology (SH209).
6. **Spill Control:** An emergency spill cart is located inside the stockroom (SH116), near the chemical stockroom (SH116 A). The cart is equipped with everything needed to identify, contain, neutralize and absorb chemical spills. Additional spill control materials are located in prep areas and some teaching labs. For mercury spills, use a mercury spill kit to contain the spill. **NOTE: Only trained personnel should respond to a hazardous chemical spill.**

**Know the appropriate actions to take in emergencies. For emergency situations requiring outside assistance, call:**

**Fire, spills, gas leaks                      9-911**

**Medical emergencies                      9-911**

**Police    9-911**

**For Campus Public Safety, call 4911.**

1. Chemical spills
  - a. Alert your instructor and all people in the lab about the spill.
  - b. You should know, before you start working, if the chemical you're using is likely to be an extreme hazard- *i.e.*, fumes that could catch fire or be an inhalation hazard. **GET OUT IF THERE IS DANGER, CLOSE THE DOOR AND REQUEST OUTSIDE EMERGENCY ASSISTANCE. CALL 9-911, THEN PUBLIC SAFETY (X4911) FROM A SAFE LOCATION.**
  - c. If the chemical is flammable, turn off ignition or heat sources, Bunsen burners, switches on nearby equipment, *etc.*, if at all possible.
  - d. Avoid breathing the vapors.
  - e. **DO NOT ATTEMPT TO CLEAN UP A LARGE SPILL UNLESS YOU ARE TRAINED TO DO SO.**

## **E. Emergency Procedures**

- f. If you are trained to respond to a small spill, put on protective clothing, and surround the spill with absorbent paper or absorbent spill control materials. (Spill control materials are found in some prep areas and on the spill cart located inside the Central Stockroom (SH116).
  - g. Turn on ventilation if it is safe to do so.
2. Fire — Most fire danger is from fumes, not burns.
    - a. Notify the laboratory instructor or supervisor immediately and pull the nearest building evacuation alarm.
    - b. **DO NOT ATTEMPT TO FIGHT A FIRE UNLESS YOU ARE TRAINED TO DO SO!**
    - c. Leave the room, closing the door behind you, then from a SAFE location, call for outside assistance by calling 9-911, then call Public Safety (X4911).
  3. Medical emergencies and injuries—For serious or life-threatening medical emergencies, call 9-911 for outside medical assistance, then call x 4911 for Public Safety.
    - a. Cuts- If little bleeding occurs, rinse the wound thoroughly and apply dressing and bandage. Notify lab personnel of the incident, including possible contaminant of wound. **IF THE CUT IS LARGE OR DEEP AND/OR BLEEDING PROFUSELY**, apply pressure and seek medical aid immediately. For less severe accidents call x 4289 to reach the campus health center in Chance Hall.
    - b. Burns- If it's from something hot and it's smaller than a nickel, wash it in cool water and apply ointment. A burn kit is located in the Microbiology/Cell Biology Lab (SH 209).
      - i. If it's large and blistered, seek medical aid.
      - ii. If you have a large burn or your clothing is ablaze or the burn is on your face (eyes, mouth, nose)- get under the emergency shower or eye wash and call for help. A fire blanket may be used to smother flames if you or your clothing is on fire.
      - iii. If it is a small chemical burn on the extremities, rinse copiously with cool water and seek medical aid.
    - c. Injuries from sharps (needles, scalpels, *etc.*) Treat these like cuts but make sure you know what was in the needle or on the scalpel and report to the lab supervisor.

- d. Accidental ingestion of chemical- NEVER PIPETTE BY MOUTH, NEVER EAT OR DRINK IN THE LAB. If something is inadvertently ingested, call the lab supervisor for help, locate the MATERIAL SAFETY DATA SHEET (MSDS) to determine appropriate action to take (*e.g.*, should you: induce vomiting?, drink lots of water?, call poison control center?)

1. **Wash hands** before leaving the laboratory, and before eating or smoking.
2. **Clean up** your work area before you leave the laboratory.
  - a. Dispose of any accumulated wastes properly. Place used razor blades, needles, *etc.* in the sharps container and broken glass in the broken glass box provided in each lab. Discarded glassware should be free of chemical contamination.
  - b. Properly label and store any chemicals and equipment still in use. Minimize clutter.
  - c. All reagent containers, microfuge tubes, *etc.* should be labeled with contents, concentration, date prepared, storage requirements, and your name, before you leave the room. Label any hazardous materials with the caution required, type of hazard, precautions for use, and instructions in case of an accident.
  - d. Clean up any clutter or spilled liquid from the floor to prevent slipping and tripping hazards.
  - e. Wash dirty glassware promptly; it should not accumulate in the sink.
3. **Secure chemicals, equipment and supplies:**
  - a. Chemicals:
    - i. Before leaving the lab, return items to the proper storage location. (*e.g.*, Are there any chemicals, media, *etc.* that need to be refrigerated or frozen?)
    - ii. Return empty chemical stock bottles to the designated location outside the chemical stockroom, so that replacements can be ordered.
  - b. Equipment:
    - iii. Clean off balances, rinse centrifuge rotors in distilled water and dry, set pH meters to stand by and check levels of electrode soaking and filling solutions. Turn off power

## IV. After the Laboratory

### A. General Clean up

on equipment you've been using unless otherwise directed by your instructor or lab supervisor. Some equipment should not be turned on and off if it will be used later in the day. Check with your instructor. Make sure gas lines, ovens, power supplies, spectrophotometers, water baths, and Bunsen burners are turned off or properly adjusted before leaving the room. Take precautions with equipment running unattended for an extended period of time. Temperature, pressure, level-control, and flow shutoffs should monitor the experiment. Hoses should be secured. Emergency instructions should be readily available. Label any experiments in progress with your name, how long the equipment will be running, and any hazards associated with the materials being used.

- iv. Fill out equipment logs. Report any problems or hazards immediately.
- v. **Reporting Problems**—Report instrumentation problems, potential electrical hazards, and low chemical stocks to the Biology Laboratory Coordinator (SH116).

## B. General Disposal Guidelines

Before you dispose of anything, ask yourself: “Where does the drain go? Where does the trash go? Will anyone be hurt if they handle this trash bag?”

### CAN YOU PUT IT DOWN THE DRAIN?

**NO**, if it is

- an organic solvent (even ethanol, unless it's less than 10%)
- toxic
- insoluble
- metal
- flammable
- corrosive
- animal waste treated with preservatives or other chemicals
- At the conclusion of lab exercises, unpreserved animals such as fish, crabs, frogs, and sponges should be disposed of in the dumpster near the

loading dock. Animal carcasses can be stored in sealed plastic bags in the freezer temporarily.

**YES** if it is

- readily biodegradable (*e.g.*, sucrose solution, buffer without other chemicals, saline solution)
- dilute acids and bases between pH 4.0 and pH 10.0 (Concentrated acids and bases must be neutralized first)

#### **CAN YOU PUT IT IN THE TRASH?**

**NO** if it is :

- contaminated biological waste
- sharp (needles, scalpels, broken glass or metal—dispose of in labeled container)
- leaking
- preserved or unpreserved animals

**YES**, if it is uncontaminated:

- paper
- intact metal cans
- plastic (disposable pipettes, pipette tips, *etc.*)
- unpreserved or untreated plant material or soil (compost if possible)

#### **WHEN IN DOUBT, ASK SOMEONE. RECYCLE IF POSSIBLE.**

1. **Disposal of Chemical Wastes**—Be aware of how to handle chemical wastes generated in the laboratory. Chemicals must be disposed of in a manner consistent with federal and state regulations.
  - a. **Disposal**—Consult the chemical label, material safety data sheet (MSDS), and/or other references before disposing of any chemicals. Do not pour chemicals down the drain or place them in the trash before consulting the appropriate references to determine that they are non-hazardous materials. Reagents should never be returned to the original container, even if there is excess left after an experiment is completed, as this practice can contaminate the entire stock.
  - b. **Hazardous waste**—Containers must be labeled with the contents and concentration, associated hazards and delivered to the designated area in the waste storage room (**SH122**) near the loading dock.

### **C. Specific Disposal Procedures**

- Ethanol is stored alone. Wastes should not accumulate in fume hoods and laboratories.
- c. **An inventory** of chemical wastes will be maintained by the Biology Laboratory Coordinator. Accumulated hazardous wastes will be removed and disposed of off-site by a waste contractor.
- 2. Disposal of Biological Wastes** - All bacteria, viruses and fungi as well as blood and blood products should be considered potentially hazardous, and autoclaved or sterilized before disposal. Sterilize or autoclave flasks, pipettes, pipette tips, *etc.* and any other materials, or equipment which have come in contact with these biological materials. Maintain stock solutions of suitable disinfectants in laboratories.
- a. **Labeling, sterilization and disposal:**
    - i. Label infectious substances, work and storage areas with the biohazard warning symbol. Individuals are responsible for maintaining the proper labeling while storing, handling, and disposing of biological materials.
    - ii. Wear personal protective equipment such as gloves and a lab coat when working with and disposing of used materials.
    - iii. Place contaminated pipettes that will be re-used in a pipette soaking jar with enough disinfectant to provide full immersion. Place inoculated petri plates, pipette tips and other disposable materials in autoclave bags.
    - iv. Autoclaving:
      - Apply autoclave indicator tape to the container, mark it “KILL”, and placed in the area designated “TO BE AUTOCLAVED”.
      - Autoclave at 15 psi for a minimum of 15 minutes. Do not use the autoclave unless you have received training.
      - After autoclaving, place sterilized materials in the “TO BE CLEANED” area or in the trash can provided for autoclaved waste.
      - NOTE: NO INFECTIOUS SUBSTANCES ARE TO ENTER THE BUILDING DRAINAGE SYSTEM OR TRASH WITHOUT PRIOR STERILIZATION.
  - b. **Clean up**
    - i. Floors, lab benches and other surfaces where infectious substances are handled are to be disinfected regularly with a suitable germicide

such as bleach or Lysol. Before and after plating, pipetting, centrifuging, and similar operations, disinfect the lab bench or surrounding area.

- ii. Spills: If a spill occurs, promptly disinfect the area and use an appropriate disposal procedure for materials used in cleanup. Wear the appropriate personal protective equipment, including disposable gloves, when handling a biological spill. Report spills to your lab instructor.

There are a number of procedures that have special safety requirements. Some of these are listed below, with a brief summary of the ways in which they're special.

All biology students will spend some time running samples in centrifuges during their career here at St. Mary's, and so it is easy to get overly comfortable with these potentially hazardous machines. Therefore, make a mental check-list from the following:

1. **Always** balance samples using a double pan balance. Different kinds of centrifuges have different balancing requirements or loading patterns: check the instructions for the one you are using. This is particularly important when many students are running their samples simultaneously. It's a good idea to have one and only one student balance and load the centrifuge.
2. **Clean up after your run.** Despite their massive, rugged appearance, centrifuge rotors (heads) are quite delicate. They pit easily when drops of chemical solutions are allowed to remain on them, and pitting tends to unbalance them. Rinse off the rotor with reverse osmosis water, and dry thoroughly after every use.
3. **Be very delicate** with the head. Dropping a centrifuge head onto a hard surface from a height of only six inches can ruin it.

**Be certain** that the head is properly seated on the spindle. Place the lid carefully on the head and tighten it. The lids are typically threaded so that they turn counter-clockwise to tighten. If it's hard to tighten it down, there's probably something wrong that extra force will only make worse.

**All radiation of wavelengths** shorter than 350 nm should be considered dangerous. **Wear protective** goggles, face

## V. Special Safety Situations

### A. Centrifuges

### B. Ultraviolet Light

shields and clothing. Warning signs should be posted wherever UV light sources are used. Keep a log of UV light source use.

## C. Vacuum Operations

1. **Vacuum operations** include suction filtration, rotary evaporation, and vacuum distillation. Check glass equipment for visible defects. Only use glassware with suitable wall thickness. Inspect tubing before use.
2. **Shield glass equipment** and wear safety goggles.
3. **When working with a vacuum pump**, use a cold trap to protect pump oil, and vent the pump into a fume hood whenever possible.
4. **Pumps with belt drives** should also have belt guards to prevent hands or loose clothing from being caught in the belt pulley.

## D. Use of Cryogenic Liquids

1. **Wear personal protective equipment (PPE) including safety glasses** and, if necessary, a face shield and cryogenic gloves when working with cryogenic liquids.
2. **Do not use glass Dewars** for filling or pouring liquid nitrogen unless they are taped or wrapped to prevent flying pieces in case of implosion. Metal or plastic Dewars are preferable.
3. **Use vented storage systems** with dispensers designed for cryogenic materials.

## E. Use of Animals

As biologists, we respect life while we try to understand it. Most biologists believe that increasing humankind's knowledge of itself and its world, and the concomitant need for biological instruction, justify the occasional use of living or unnaturally killed animals. No biologist should destroy life wantonly or without due consideration of the tradeoffs involved.

Feelings and regulations about animal use become more severe as the animals become phylogenetically closer to *Homo sapiens*. Few people find it objectionable when scientists dissect living *Crassostrea* or *Callinectes*; more become upset when the subject is *Rattus*; biological work on primates is effectively restricted to people working on diseases of immense human importance.

There are special rules and regulations about keeping, handling, and disposing of many kinds of animals, particularly mammals. These rules specify the types and

capacity of cages, cleaning and inspection schedules, special ventilation requirements, and so on. The SMCM Institutional Animal Care and Use Committee (IACUC) is responsible for the review and approval of all uses of live vertebrate animals on campus for teaching and research activities. IACUC Activities are mandated by the U.S. Animal Welfare Act and the U.S. Public Health Service Policy. If you work with live vertebrate animals, your instructor or supervisor will discuss the appropriate procedures with you.

Any experimentation with human subjects, except yourself, regardless of how harmless it seems, must be cleared by the Human Subjects Panel at the College.

Some agents such as viruses and bacteria that pose moderate hazards to personnel or the environment must be stored and handled in restricted spaces designated as Biosafety Level 2 (BSL-2). The BSL-2 designated laboratories in Schaefer Hall are SH 209B, SH 210, SH 211, and SH250. Access to these laboratories is limited to trained personnel. Contact the BSL-2 lab coordinator, Dr. Jeffrey Byrd for more information.

## **E. Pathogenic Agents and Organisms**

The College's policies on access to Schaefer Hall reflect a complex set of changing

## **VI. Building Access and Personal Security**

### **A. Working alone in the lab is not allowed.**

circumstances, including among others permitting students to work on independent projects, providing good places to study, protecting the physical safety of students, protecting College property, and maintaining an atmosphere of free intellectual inquiry. At this writing, Schaefer Hall is completely open and unlocked during normal working hours, and allows holders of valid student or faculty ID cards access until midnight. After midnight, no new access is permitted and students are encouraged to leave (even St. Mary's College students have to sleep), although people will not generally be evicted if they are already inside.

### **B. Don't Circumvent Access Policies**

Please do not try to circumvent these access policies. They are not designed to keep any constituency—students, faculty, staff, community—from using Schaefer Hall to the fullest. Rather, they are designed to make a rational compromise between access and security. Please do not give out the combinations of combination locks, pass around or duplicate any keys you have, lend your ID card to anyone else, prop open doors, and so on.

If someone you don't know tries to get in (by following you closely, for example, or by tapping on a window and looking forlorn), you're confronted with a diplomatic problem. Do you alienate someone and follow the rules, or do you allow yourself to be manipulated and break them? Follow the rules. If the person in question is supposed to be inside, she'll have an ID card and can get in herself!

### **C. Be Aware of Basic Personal Safety Precautions**

Schaefer Hall is a public building, with hundreds of people walking in and out every day. It is not a pristine haven from the real world, but it isn't a hotbed of violent crime either. Take reasonable precautions: don't leave backpacks or other valuables in unlocked areas where you can't see them. Don't work alone, especially at night (be aware that in a lighted room at night, unless you pull the shades down, you are effectively on display to all who might walk by). There are emergency telephones, hooked directly to Public

Safety, in all major hallways of Schaefer Hall; don't hesitate to use them if you feel threatened.

**SAMPLE MATERIAL SAFETY DATA SHEET**

Valid 05/2000 - 07/2000  
 Sigma Chemical Co.  
 P.O. Box 14508  
 St. Louis, MO 63178 USA  
 Tel: 314-771-5765

M A T E R I A L S A F E T Y D A T A S H E E T

SECTION 1. ----- CHEMICAL IDENTIFICATION-----

CATALOG #: S2002  
 NAME: SODIUM AZIDE

SECTION 2. ----- COMPOSITION/INFORMATION ON INGREDIENTS -----

CAS #: 26628-22-8  
 MF: N3NA  
 EC NO: 247-852-1

SYNONYMS

AZIDE, SODIUM \* AZOTURE DE SODIUM (FRENCH) \* AZYDEK SODU (POLISH) \*  
 KAZOE \* NATRIUMAZID (GERMAN) \* NATRIUMMAZIDE (DUTCH) \* NCI-C06462 \*  
 NEMAZYD \* NSC 3072 \* RCRA WASTE NUMBER P105 \* SMITE \* SODIUM AZIDE  
 (ACGIH) \* SODIUM, AZOTURE DE (FRENCH) \* SODIUM, AZOTURO DI (ITALIAN) \*  
 U-3886 \*

SECTION 3. ----- HAZARDS IDENTIFICATION -----

LABEL PRECAUTIONARY STATEMENTS

HIGHLY TOXIC (USA)  
 VERY TOXIC (EU)  
 MAY CAUSE HERITABLE GENETIC DAMAGE.  
 VERY TOXIC BY INHALATION, IN CONTACT WITH SKIN AND IF SWALLOWED.  
 CONTACT WITH ACIDS LIBERATES VERY TOXIC GAS.  
 HEATING MAY CAUSE AN EXPLOSION.  
 READILY ABSORBED THROUGH SKIN.  
 AVOID CONTACT WITH METALS.  
 TARGET ORGAN(S):  
 NERVES  
 HEART  
 IN CASE OF ACCIDENT OR IF YOU FEEL UNWELL, SEEK MEDICAL ADVICE  
 IMMEDIATELY (SHOW THE LABEL WHERE POSSIBLE).  
 WEAR SUITABLE PROTECTIVE CLOTHING, GLOVES AND EYE/FACE  
 PROTECTION.  
 DO NOT BREATHE DUST.

SECTION 4. ----- FIRST-AID MEASURES-----

IF SWALLOWED, WASH OUT MOUTH WITH WATER PROVIDED PERSON IS CONSCIOUS.  
 CALL A PHYSICIAN IMMEDIATELY.  
 IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING GIVE ARTIFICIAL  
 RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.  
 IN CASE OF SKIN CONTACT, FLUSH WITH COPIOUS AMOUNTS OF WATER  
 FOR AT LEAST 15 MINUTES. REMOVE CONTAMINATED CLOTHING AND  
 SHOES. CALL A PHYSICIAN.  
 IN CASE OF CONTACT WITH EYES, FLUSH WITH COPIOUS AMOUNTS OF WATER  
 FOR AT LEAST 15 MINUTES. ASSURE ADEQUATE FLUSHING BY SEPARATING  
 THE EYELIDS WITH FINGERS. CALL A PHYSICIAN.

SECTION 5. ----- FIRE FIGHTING MEASURES -----

EXTINGUISHING MEDIA

DRY CHEMICAL POWDER.  
 DO NOT USE WATER.

SPECIAL FIREFIGHTING PROCEDURES

WEAR SELF-CONTAINED BREATHING APPARATUS AND PROTECTIVE CLOTHING TO  
 PREVENT CONTACT WITH SKIN AND EYES.  
 UNUSUAL FIRE AND EXPLOSIONS HAZARDS  
 EMITS TOXIC FUMES UNDER FIRE CONDITIONS.  
 CONTAINER EXPLOSION MAY OCCUR UNDER FIRE CONDITIONS.

SECTION 6. ----- ACCIDENTAL RELEASE MEASURES-----

WEAR SELF-CONTAINED BREATHING APPARATUS, RUBBER BOOTS AND HEAVY

RUBBER GLOVES.  
SWEEP UP, PLACE IN A BAG AND HOLD FOR WASTE DISPOSAL.  
AVOID RAISING DUST.  
VENTILATE AREA AND WASH SPILL SITE AFTER MATERIAL PICKUP IS COMPLETE.  
EVACUATE AREA.

SECTION 7.----- HANDLING AND STORAGE-----

REFER TO SECTION 8.

SECTION 8.----- EXPOSURE CONTROLS/PERSONAL PROTECTION-----

SAFETY SHOWER AND EYE BATH.  
USE ONLY IN A CHEMICAL FUME HOOD.  
WASH CONTAMINATED CLOTHING BEFORE REUSE.  
WASH THOROUGHLY AFTER HANDLING.  
DO NOT BREATHE DUST.  
DO NOT GET IN EYES, ON SKIN, ON CLOTHING.  
AVOID PROLONGED OR REPEATED EXPOSURE.  
NIOSH/MSHA-APPROVED RESPIRATOR.  
COMPATIBLE CHEMICAL-RESISTANT GLOVES.  
CHEMICAL SAFETY GOGGLES.  
KEEP TIGHTLY CLOSED.  
STORE IN A COOL DRY PLACE.  
EXPLODES WHEN HEATED.  
AZIDE REACTS WITH MANY HEAVY METALS SUCH AS LEAD, COPPER, MERCURY,  
SILVER, GOLD TO FORM EXPLOSIVE COMPOUNDS. COPPER AND LEAD AZIDES ARE  
MORE SENSITIVE THAN NITROGLYCERINE. AZIDE REACTS WITH METAL HALIDES  
TO GIVE A RANGE OF METAL AZIDE HALIDES, MANY OF WHICH ARE EXPLOSIVE.  
INCOMPATIBLE WITH CHROMYL CHLORIDE, HYDRAZINE, BROMINE, CARBON  
DISULFIDE, DIMETHYL SULFATE, DIBROMOMALONITRILE.  
HEAT-SENSITIVE.

SECTION 9.----- PHYSICAL AND CHEMICAL PROPERTIES-----

PHYSICAL PROPERTIES

SOLUBILITY:

WATER -Z26130

SPECIFIC GRAVITY: 1,85

PH: 10,0

SECTION 10.----- STABILITY AND REACTIVITY-----

STABILITY

STABLE.

INCOMPATIBILITIES

HALOGENATED SOLVENTS

AVOID CONTACT WITH METALS.

AVOID CONTACT WITH ACID.

ACID CHLORIDES

HAZARDOUS COMBUSTION OR DECOMPOSITION PRODUCTS

NITROGEN OXIDES

HAZARDOUS POLYMERIZATION

WILL NOT OCCUR.

SECTION 11.----- TOXICOLOGICAL INFORMATION-----

ACUTE EFFECTS

MAY CAUSE SKIN IRRITATION.

MAY CAUSE EYE IRRITATION.

MATERIAL MAY BE IRRITATING TO MUCOUS MEMBRANES AND UPPER  
RESPIRATORY TRACT.

MAY BE FATAL IF INHALED, SWALLOWED, OR ABSORBED THROUGH SKIN.

EXPOSURE CAN CAUSE:

NAUSEA, HEADACHE AND VOMITING

LABORATORY EXPERIMENTS IN ANIMALS HAVE SHOWN SODIUM AZIDE TO PRODUCE  
A PROFOUND HYPOTENSIVE EFFECT, DEMYELINATION OF MYELINATED NERVE  
FIBERS IN THE CENTRAL NERVOUS SYSTEM, TESTICULAR DAMAGE, BLINDNESS,  
ATTACKS OF RIGIDITY, HEPATIC AND CEREBRAL EFFECTS.

CHRONIC EFFECTS

TARGET ORGAN(S):

NERVES, HEART

BRAIN  
MAY ALTER GENETIC MATERIAL.  
RTECS #: VY8050000  
SODIUM AZIDE  
TOXICITY DATA

ORL-WMN LDLO:786 MG/KG	MTAEEB 4,219,1989
ORL-MAN LDLO:29 MG/KG	MTAEEB 4,219,1989
ORL-MAN LDLO:129 MG/KG	JATOD3 20,134,1996
ORL-WMN LDLO:14 MG/KG	JFSCAS 35,193,1990
ORL-MAN LDLO:143 MG/KG	JTCTDW 24,339,1986
ORL-RAT LD50:27 MG/KG	FMCHA2 -,C32,1991
SCU-RAT LD50:45100 UG/KG	MEPAAX 12,427,1961
ITR-RAT LD50:47500 UG/KG	MEPAAX 12,427,1961
ORL-MUS LD50:27 MG/KG	CLDND*
IPR-MUS LD50:28 MG/KG	JHHTAB 30,98,1948
SCU-MUS LD50:23060 UG/KG	MEPAAX 12,427,1961
IVN-MUS LD50:19 MG/KG	CLDND*
UNR-MUS LD50:27 MG/KG	BJCAAI 6,160,1952
SKN-RBT LD50:20 MG/KG	FMCHA2 -,C32,1991
ORL-BWD LD50:23700 UG/KG	AECTCV 12,355,1983

TARGET ORGAN DATA  
BRAIN AND COVERINGS (INCREASED INTRACRANIAL PRESSURE)  
PERIPHERAL NERVE AND SENSATION (SPASTIC PARALYSIS WITH/WITHOUT SENSORY CH  
SENSE ORGANS AND SPECIAL SENSES (MYDRIASIS)  
BEHAVIORAL (GENERAL ANESTHETIC)  
BEHAVIORAL (SOMNOLENCE)  
BEHAVIORAL (CONVULSIONS OR EFFECT ON SEIZURE THRESHOLD)  
BEHAVIORAL (CHANGE IN MOTOR ACTIVITY)  
BEHAVIORAL (COMA)  
BEHAVIORAL (HEADACHE)  
BEHAVIORAL (IRRITABILITY)  
CARDIAC (ARRYTHMIAS)  
CARDIAC (PULSE RATE DECREASED WITH FALL IN BP)  
CARDIAC (CHANGE IN FORCE OF CONTRACTION)  
CARDIAC (OTHER CHANGES)  
VASCULAR (BP LOWERING NOT CHARACTERIZED IN AUTONOMIC SECTION)  
LUNGS, THORAX OR RESPIRATION (ACUTE PULMONARY EDEMA)  
LUNGS, THORAX OR RESPIRATION (DYSPPNAE)  
LUNGS, THORAX OR RESPIRATION (RESPIRATORY STIMULATION)  
LUNGS, THORAX OR RESPIRATION (OTHER CHANGES)  
GASTROINTESTINAL (HYPERMOTILITY, DIARRHEA)  
KIDNEY, URETER, BLADDER (OTHER CHANGES)  
ONLY SELECTED REGISTRY OF TOXIC EFFECTS OF CHEMICAL SUBSTANCES  
(RTECS) DATA IS PRESENTED HERE. SEE ACTUAL ENTRY IN RTECS FOR  
COMPLETE INFORMATION.

SECTION 12. ----- ECOLOGICAL INFORMATION -----  
DATA NOT YET AVAILABLE.

SECTION 13. ----- DISPOSAL CONSIDERATIONS -----  
CONTACT A LICENSED PROFESSIONAL WASTE DISPOSAL SERVICE TO DISPOSE OF  
THIS MATERIAL.  
OBSERVE ALL FEDERAL, STATE AND LOCAL ENVIRONMENTAL REGULATIONS.

SECTION 14. ----- TRANSPORT INFORMATION -----  
CONTACT SIGMA CHEMICAL COMPANY FOR TRANSPORTATION INFORMATION.

SECTION 15. ----- REGULATORY INFORMATION -----  
EUROPEAN INFORMATION  
EC INDEX NO: 011-004-00-7  
VERY TOXIC  
R 28  
VERY TOXIC IF SWALLOWED.  
R 32  
CONTACT WITH ACIDS LIBERATES VERY TOXIC GAS.  
S 3/9/49

AFTER CONTACT WITH SKIN, WASH IMMEDIATELY WITH PLENTY OF SOAP-SUDS.

S 45

IN CASE OF ACCIDENT OR IF YOU FEEL UNWELL, SEEK MEDICAL ADVICE IMMEDIATELY (SHOW THE LABEL WHERE POSSIBLE).

REVIEWS, STANDARDS, AND REGULATIONS

OEL=MAK

ACGIH TLV-NOT CLASSIFIABLE AS A HUMAN CARCINOGEN DTLVS\* TLV/BEI,1999

ACGIH TLV-CL 0.29 MG/M3 (SODIUM AZIDE) DTLVS\* TLV/BEI,1999

OEL-AUSTRALIA:TWA 0.1 PPM (0.3 MG/M3) JAN 1993

OEL-AUSTRIA: MAK 0.07 PPM (0.2 MG/M3), JAN1999

OEL-BELGIUM:STEL 0.11 PPM (0.3 MG/M3) JAN 1993

OEL-DENMARK: TWA 0.3 MG/M3, JAN1999

OEL-FINLAND:TWA 0.1 PPM (0.3 MG/M3);STEL 0.3 PPM (0.9 MG/M3) JAN 1993

OEL-GERMANY:TWA 0.07 PPM (0.2 MG/M3) JAN 1993

OEL-THE NETHERLANDS:TWA 0.1 PPM (0.3 MG/M3) JAN 1993

OEL-SWITZERLAND:TWA 0.07 PPM (0.2 MG/M3) JAN 1993

OEL-UNITED KINGDOM:TWA 0.1 PPM (0.3 MG/M3);STEL JAN 1993

OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA CHECK ACGIH TLV

OEL IN NEW ZEALAND, SINGAPORE, VIETNAM CHECK ACGIH TLV

NIOSH REL TO SODIUM AZIDE, AS HN3-AIR:CL 0.1 PPM (SK)

NIOSH\* DHHS #92-100,1992

NOHS 1974: HZD 68820; NIS 13; TNF 877; NOS 10; TNE 5953

NOES 1983: HZD 68820; NIS 19; TNF 3640; NOS 27; TNE 54959; TFE 38370

EPA GENETOX PROGRAM 1988, POSITIVE: L5178Y CELLS IN VITRO-TK TEST

EPA GENETOX PROGRAM 1988, POSITIVE: D MELANOGASTER SEX-LINKED LETHAL

EPA GENETOX PROGRAM 1988, POSITIVE: S CEREVISIAE GENE CONVERSION

EPA GENETOX PROGRAM 1988, POSITIVE: S CEREVISIAE-FORWARD MUTATION; S CEREVISIAE-REVERSION

EPA GENETOX PROGRAM 1988, NEGATIVE: IN VITRO CYTOGENETICS-HUMAN LYMPHOCYTE

EPA GENETOX PROGRAM 1988, NEGATIVE: SPERM MORPHOLOGY-MOUSE; IN VITRO UDS-HUMAN FIBROBLAST

EPA GENETOX PROGRAM 1988, NEGATIVE: TRP REVERSION

EPA GENETOX PROGRAM 1988, INCONCLUSIVE: CARCINOGENICITY-MOUSE/RAT; TRP REVERSION

EPA TSCA SECTION 8(B) CHEMICAL INVENTORY

EPA TSCA SECTION 8(D) UNPUBLISHED HEALTH/SAFETY STUDIES

ON EPA IRIS DATABASE

EPA TSCA TEST SUBMISSION (TSCATS) DATA BASE, DECEMBER 1999

NIOSH CURRENT INTELLIGENCE BULLETIN 13, 1976

NTP CARCINOGENESIS STUDIES (GAVAGE); NO EVIDENCE: RAT

NTPTR\* NTP-TR-389,1991

U.S. INFORMATION

THIS PRODUCT IS SUBJECT TO SARA SECTION 313 REPORTING REQUIREMENTS.

SECTION 16. ----- OTHER INFORMATION-----

THE ABOVE INFORMATION IS BELIEVED TO BE CORRECT BUT DOES NOT PURPORT TO BE ALL INCLUSIVE AND SHALL BE USED ONLY AS A GUIDE. SIGMA, ALDRICH, FLUKA SHALL NOT BE HELD LIABLE FOR ANY DAMAGE RESULTING FROM HANDLING OR FROM CONTACT WITH THE ABOVE PRODUCT. SEE REVERSE SIDE OF INVOICE OR PACKING SLIP FOR ADDITIONAL TERMS AND CONDITIONS OF SALE.

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