

# 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 practical examinations)
- 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 Safety Data Sheets or SDSs. SDSs 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 SDSs available to students anyway. The SDSs are available in the seminar room, second floor, west wing, of Schaefer Hall (SH222).

There is a sample SDS at the end 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.
- Normal physical and chemical characteristics, such as normal appearance and odor, boiling/vaporization and melting point, solubility, specific gravity and density.

## **Visitors and others**

## **Hazard Communication and Safety Data Sheets (SDS)**

- 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 SDSs in laboratory instructions or provide the SDSs 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, it is the user's fundamental responsibility for knowing the safety-related properties of laboratory materials. Such properties are always fair game for examination questions! Bottom line: **Read the SDSs.**

## 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.

## II. Working in the Laboratory

### A. Proper laboratory practices

**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.

**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 seal 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

## III. Inside the Laboratory

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

- 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. Consult a glove compatibility chart before you begin. For example:

[http://www.ansellpro.com/download/Ansell\\_7thEditionChemicalResistanceGuide.pdf](http://www.ansellpro.com/download/Ansell_7thEditionChemicalResistanceGuide.pdf) 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
  - 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.

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. Examples of equipment for which you must be thoroughly trained before you attempt to use them are:

- centrifuges, especially high speed (see Section VI (A))
- autoclaves- do not use without supervision (see section IV (2))
- 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
- any equipment that employs high pressure or high/low temperature
- shop equipment including but not limited to drills, saws, etc.

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

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

## C. Special hazards

## D. Safety Equipment

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 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.**

## E. Emergency Procedures

**Know the appropriate actions to take in emergencies.**

**For emergency situations requiring outside assistance, call:**

	Campus phone	Mobile phone
<b>Fire, spills, gas leaks</b>	<b>9-911</b>	<b>911</b>
<b>Medical emergencies</b>	<b>9-911</b>	<b>911</b>
<b>Police</b>	<b>9-911</b>	<b>911</b>
<b>Campus Public Safety</b>	<b>4911</b>	<b>240-895-4911</b>

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.

- c. **GET OUT IF THERE IS DANGER. CLOSE THE DOOR AND REQUEST OUTSIDE EMERGENCY ASSISTANCE (911) FROM A SAFE LOCATION.**
  - d. If the chemical is flammable, turn off ignition or heat sources, Bunsen burners, switches on nearby equipment, *etc.*, if at all possible.
  - e. Avoid breathing the vapors.
  - f. **DO NOT ATTEMPT TO CLEAN UP A LARGE SPILL UNLESS YOU ARE TRAINED TO DO SO.**
  - g. 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).
  - h. 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 **911** and Public Safety (**240-895-4911**).
  3. Medical emergencies and injuries—For serious or life-threatening medical emergencies, call **911** for outside medical assistance, then call **240-895-4911** 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 **240-895-4289** 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?)

## IV. After the Laboratory

### A. General Clean up

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 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 that are free from hazardous materials 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.

## **C. Specific Disposal Procedures**

- a. **Disposal**—Consult the chemical label, safety data sheet (SDS), 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 hazard-free. 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. Ethanol is stored alone. Wastes should not accumulate in fume hoods and laboratories.
  - c. **The Biology Laboratory Coordinator will maintain an inventory of chemical wastes.** 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.

## **V. Special Safety Situations**

## A. Centrifuges

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.

## B. Ultraviolet Light

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

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.

## D. Use of Cryogenic Liquids

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.

## E. Use of Animals

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. The U.S. Animal Welfare Act and the U.S. Public Health Service Policy mandate IACUC Activities. 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 St. Mary's College of Maryland Institutional Review Board.

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

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.

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

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

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

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.

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

# SAMPLE SAFETY DATA SHEET

SIGMA-ALDRICH

sigma-aldrich.com

SAFETY DATA SHEET

Version 4.11  
Revision Date 08/21/2015  
Print Date 07/27/2016**1. PRODUCT AND COMPANY IDENTIFICATION**

- 1.1 Product identifiers**  
Product name : Sodium azide  
Product Number : 438456  
Brand : Aldrich  
Index-No. : 011-004-00-7  
CAS-No. : 26628-22-8
- 1.2 Relevant identified uses of the substance or mixture and uses advised against**  
Identified uses : Laboratory chemicals, Synthesis of substances
- 1.3 Details of the supplier of the safety data sheet**  
Company : Sigma-Aldrich  
3050 Spruce Street  
SAINT LOUIS MO 63103  
USA  
Telephone : +1 800-325-5832  
Fax : +1 800-325-5052
- 1.4 Emergency telephone number**  
Emergency Phone # : (314) 776-8555

**2. HAZARDS IDENTIFICATION**

- 2.1 Classification of the substance or mixture**  
GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)  
Acute toxicity, Oral (Category 2), H300  
Acute toxicity, Dermal (Category 1), H310  
Specific target organ toxicity - repeated exposure, Oral (Category 2), Brain, H373  
Acute aquatic toxicity (Category 1), H400  
Chronic aquatic toxicity (Category 1), H410  
For the full text of the H-Statements mentioned in this Section, see Section 16.
- 2.2 GHS Label elements, including precautionary statements**  
Pictogram   
Signal word : Danger  
Hazard statement(s)  
H300 + H310 : Fatal if swallowed or in contact with skin  
H373 : May cause damage to organs (Brain) through prolonged or repeated exposure if swallowed.  
H410 : Very toxic to aquatic life with long lasting effects.  
Precautionary statement(s)  
P260 : Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.  
P262 : Do not get in eyes, on skin, or on clothing.  
P264 : Wash skin thoroughly after handling.

Aldrich - 438456

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- P270 : Do not eat, drink or smoke when using this product.  
P273 : Avoid release to the environment.  
P280 : Wear protective gloves/ protective clothing/ eye protection/ face protection.  
P301 + P310 + P330 : IF SWALLOWED: Immediately call a POISON CENTER or doctor/ physician. Rinse mouth.  
P302 + P350 + P310 : IF ON SKIN: Gently wash with plenty of soap and water. Immediately call a POISON CENTER or doctor/ physician.  
P314 : Get medical advice/ attention if you feel unwell.  
P362 : Take off contaminated clothing and wash before reuse.  
P501 : Collect spillage.  
P405 : Store locked up.  
P501 : Dispose of contents/ container to an approved waste disposal plant.
- 2.3 Hazards not otherwise classified (HNOC) or not covered by GHS**  
Contact with acids liberates very toxic gas.  
Sodium Azide may react with lead and copper plumbing to form highly explosive metal azides. Rapidly absorbed through skin.

**3. COMPOSITION/INFORMATION ON INGREDIENTS**

- 3.1 Substances**  
Formula :  $\text{N}_3\text{Na}$   
Molecular weight : 65.01 g/mol  
CAS-No. : 26628-22-8  
EC-No. : 247-852-1  
Index-No. : 011-004-00-7

Component	Classification	Concentration
Sodium azide	Acute Tox. 2; Acute Tox. 1; STOT RE 2; Aquatic Acute 1; Aquatic Chronic 1; H300 + H310, H373, H410	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

**4. FIRST AID MEASURES**

- 4.1 Description of first aid measures**  
**General advice**  
Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.  
**If inhaled**  
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.  
**In case of skin contact**  
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.  
**In case of eye contact**  
Flush eyes with water as a precaution.  
**If swallowed**  
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.
- 4.2 Most important symptoms and effects, both acute and delayed**  
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11
- 4.3 Indication of any immediate medical attention and special treatment needed**  
No data available

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**5. FIREFIGHTING MEASURES**

- 5.1 Extinguishing media**  
**Suitable extinguishing media**  
 Dry powder
- 5.2 Special hazards arising from the substance or mixture**  
 Sodium oxides
- 5.3 Advice for firefighters**  
 Wear self-contained breathing apparatus for firefighting if necessary.
- 5.4 Further information**  
 No data available

**6. ACCIDENTAL RELEASE MEASURES**

- 6.1 Personal precautions, protective equipment and emergency procedures**  
 Wear respiratory protection. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust. For personal protection see section 8.
- 6.2 Environmental precautions**  
 Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.
- 6.3 Methods and materials for containment and cleaning up**  
 Pick up and arrange disposal without creating dust. Sweep up and shovel. Do not flush with water. Keep in suitable, closed containers for disposal.
- 6.4 Reference to other sections**  
 For disposal see section 13.

**7. HANDLING AND STORAGE**

- 7.1 Precautions for safe handling**  
 Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs. Provide appropriate exhaust ventilation at places where dust is formed. For precautions see section 2.2.
- 7.2 Conditions for safe storage, including any incompatibilities**  
 Keep container tightly closed in a dry and well-ventilated place. Never allow product to get in contact with water during storage. Do not store near acids. Heat sensitive. Storage class (TRGS 510): Non-combustible, acute toxic Cat. 1 and 2 / very toxic hazardous materials
- 7.3 Specific end use(s)**  
 Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

**8. EXPOSURE CONTROLS/PERSONAL PROTECTION**

**8.1 Control parameters**

Components with workplace control parameters			
Component	CAS-No.	Value	Control parameters Basis
Sodium azide	26628-22-8	C	0.100000 ppm USA, NIOSH Recommended Exposure Limits
	Remarks	Potential for dermal absorption	
		C	0.300000 mg/m3 USA, NIOSH Recommended Exposure Limits
		Potential for dermal absorption	

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	C	0.110000 ppm	USA, ACGIH Threshold Limit Values (TLV)
		Lung damage Cardiac impairment Not classifiable as a human carcinogen	
	C	0.290000 mg/m3	USA, ACGIH Threshold Limit Values (TLV)
		Lung damage Cardiac impairment Not classifiable as a human carcinogen	
	C	0.110000 ppm	USA, ACGIH Threshold Limit Values (TLV)
		Lung damage Cardiac impairment Not classifiable as a human carcinogen	
	C	0.290000 mg/m3	USA, ACGIH Threshold Limit Values (TLV)
		Lung damage Cardiac impairment Not classifiable as a human carcinogen	
	C	0.11 ppm	USA, ACGIH Threshold Limit Values (TLV)
		Lung damage Cardiac impairment Not classifiable as a human carcinogen	
	C	0.29 mg/m3	USA, ACGIH Threshold Limit Values (TLV)
		Lung damage Cardiac impairment Not classifiable as a human carcinogen	
	C	0.1 ppm	USA, NIOSH Recommended Exposure Limits
		Potential for dermal absorption	
	C	0.3 mg/m3	USA, NIOSH Recommended Exposure Limits
		Potential for dermal absorption	
	C	0.1 ppm	USA, OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		Skin notation	
	C	0.3 mg/m3	USA, OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		Skin notation	

**8.2 Exposure controls**

**Appropriate engineering controls**  
 Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

**Personal protective equipment**

**Eye/face protection**  
 Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

**Skin protection**  
 Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact  
 Material: Nitrile rubber  
 Minimum layer thickness: 0.11 mm

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Break through time: 480 min  
 Material tested: Dermatri® (KCL 740 / Aldrich Z677272, Size M)  
 Splash contact  
 Material: Nitrile rubber  
 Minimum layer thickness: 0.11 mm  
 Break through time: 480 min  
 Material tested: Dermatri® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374  
 If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

**Body Protection**  
 Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

**Respiratory protection**  
 Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Control of environmental exposure**  
 Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

**9. PHYSICAL AND CHEMICAL PROPERTIES**

**9.1 Information on basic physical and chemical properties**

a) Appearance	Form: crystalline Colour: white
b) Odour	No data available
c) Odour Threshold	No data available
d) pH	10 at 65 g/l at 25 °C (77 °F)
e) Melting point/freezing point	275 °C (527 °F)
f) Initial boiling point and boiling range	No data available
g) Flash point	No data available
h) Evaporation rate	No data available
i) Flammability (solid, gas)	The product is not flammable. - Flammability (solids)
j) Upper/lower flammability or explosive limits	No data available
k) Vapour pressure	0.01 hPa (0.01 mmHg) at 20 °C (68 °F)
l) Vapour density	No data available
m) Relative density	1.850 g/cm3
n) Water solubility	65 g/l at 20 °C (68 °F) - completely soluble
o) Partition coefficient: n-octanol/water	No data available
p) Auto-ignition temperature	309 °C (588 °F) at 1,013 hPa (760 mmHg)

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q) Decomposition temperature	300 °C (572 °F) -
r) Viscosity	No data available
s) Explosive properties	Not explosive
t) Oxidizing properties	No data available

**9.2 Other safety information**

Bulk density	0.8 kg/m3
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**10. STABILITY AND REACTIVITY**

**10.1 Reactivity**

No data available

**10.2 Chemical stability**

Stable under recommended storage conditions.

**10.3 Possibility of hazardous reactions**

No data available

**10.4 Conditions to avoid**

An explosion occurred when a mixture of sodium azide, methylene chloride, dimethyl sulfoxide, and sulfuric acid were being concentrated on a rotary evaporator.

**10.5 Incompatible materials**

Halogenated hydrocarbon, Metals, Acids, Acid chlorides, Hydrazine, Dimethyl sulfate, Inorganic acid chlorides

**10.6 Hazardous decomposition products**

Other decomposition products - No data available  
 In the event of fire: see section 5

**11. TOXICOLOGICAL INFORMATION**

**11.1 Information on toxicological effects**

**Acute toxicity**

No data available

Inhalation: No data available

Dermal: No data available

No data available

**Skin corrosion/irritation**

Skin - reconstructed human epidermis (RhE)  
 Result: No skin irritation - 15 min

**Serious eye damage/eye irritation**

Eyes - Bovine cornea  
 Result: No eye irritation - 4 h  
 (OECD Test Guideline 437)

**Respiratory or skin sensitisation**

in vivo assay - Mouse  
 Result: Does not cause skin sensitisation.  
 (OECD Test Guideline 429)

**Germ cell mutagenicity**

No data available

**Carcinogenicity**

Carcinogenicity - Rat - male and female - Oral  
 No significant adverse effects were reported

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as

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probable, possible or confirmed human carcinogen by IARC.

**NTP:** No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

**OSHA:** No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

**Reproductive toxicity**

No data available

No data available

**Specific target organ toxicity - single exposure**

No data available

**Specific target organ toxicity - repeated exposure**

Oral - May cause damage to organs through prolonged or repeated exposure. - Brain

**Aspiration hazard**

No data available

**Additional Information**

Repeated dose toxicity Rat - male and female - Oral - LOAEL : 5 mg/kg

RTECS: VY8050000

Nausea, Headache, 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, and hepatic and cerebral effects. To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

## 12. ECOLOGICAL INFORMATION

### 12.1 Toxicity

Toxicity to fish mortality LC50 - Pimephales promelas (fathead minnow) - 5.46 mg/l - 96 h (OECD Test Guideline 203)

Toxicity to algae static test EC50 - Pseudokirchneriella subcapitata - 0.35 mg/l - 96 h (OECD Test Guideline 201)

### 12.2 Persistence and degradability

No data available

### 12.3 Bioaccumulative potential

No data available

### 12.4 Mobility in soil

No data available

### 12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

### 12.6 Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal. Very toxic to aquatic life with long lasting effects.

## 13. DISPOSAL CONSIDERATIONS

### 13.1 Waste treatment methods

**Product**

Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

**Contaminated packaging**

Dispose of as unused product.

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## 14. TRANSPORT INFORMATION

**DOT (US)**

UN number: 1687 Class: 6.1 Packing group: II  
 Proper shipping name: Sodium azide  
 Reportable Quantity (RQ): 1000 lbs

Poison Inhalation Hazard: No

**IMDG**

UN number: 1687 Class: 6.1 Packing group: II EMS-No: F-A, S-A  
 Proper shipping name: SODIUM AZIDE  
 Marine pollutant: yes

**IATA**

UN number: 1687 Class: 6.1 Packing group: II  
 Proper shipping name: Sodium azide

## 15. REGULATORY INFORMATION

**SARA 302 Components**

The following components are subject to reporting levels established by SARA Title III, Section 302:

Sodium azide	CAS-No.	Revision Date
	26628-22-8	2007-07-01

**SARA 313 Components**

The following components are subject to reporting levels established by SARA Title III, Section 313:

Sodium azide	CAS-No.	Revision Date
	26628-22-8	2007-07-01

**SARA 311/312 Hazards**

Acute Health Hazard

**Massachusetts Right To Know Components**

Sodium azide	CAS-No.	Revision Date
	26628-22-8	2007-07-01

**Pennsylvania Right To Know Components**

Sodium azide	CAS-No.	Revision Date
	26628-22-8	2007-07-01

**New Jersey Right To Know Components**

Sodium azide	CAS-No.	Revision Date
	26628-22-8	2007-07-01

**California Prop. 65 Components**

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

## 16. OTHER INFORMATION

**Full text of H-Statements referred to under sections 2 and 3.**

Acute Tox	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
H300	Fatal if swallowed.
H300 + H310	Fatal if swallowed or in contact with skin
H310	Fatal in contact with skin.
H373	May cause damage to organs through prolonged or repeated exposure if swallowed.
H400	Very toxic to aquatic life.

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**HMIS Rating**  
Health hazard: 4  
Chronic Health Hazard: 0  
Flammability: 0  
Physical Hazard 0

**NFPA Rating**  
Health hazard: 4  
Fire Hazard: 0  
Reactivity Hazard: 0

**Further information**

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