



1. Purpose

This standard operating procedure (SOP) establishes procedures for the safe handling, transportation, and storage of sodium azide, also known as azide, azium, smite and the sodium salt of hydrazoic acid (CAS#26628-22-8).

2. Scope

This SOP addresses only the use of pure sodium azide and its solutions at 5% or greater in the laboratory. It applies to all Kennesaw State University (KSU) employees, students, and contractors. It assumes that all the KSU minimum safety requirements, as detailed in the KSU Chemical Hygiene Plan have been implemented.

3. Personnel Qualifications and Responsibilities

All faculty, staff and students engaged in the use or handling of sodium azide, or working within a laboratory using sodium azide, are responsible for understanding all hazards associated with its use, and for using appropriate personal protective equipment (PPE).

The principal investigator (PI)/laboratory supervisor is responsible for ensuring that his/her staff have been trained in the use, storage, handling, and emergency procedures for sodium azide. Records of this training must be retained by the department and a copy forwarded to the Environmental Health and Safety (EHS) Department.

Sodium azide use is restricted to the specific employees or students who have had prior training in proper use, handling, and storage, and first aid procedures.

4. Health and Safety Hazards of Sodium Azide

Sodium azide (NaN_3) is a colorless crystalline solid and is readily soluble in water. Dilute solutions of sodium azide are used in research laboratories as a preservative. This use generally presents no extraordinary dangers to the user, but it should be noted that weak solutions of sodium azide (0.1 to 1.0%) are eye and skin irritants.

Of greater concern is the use and storage of pure sodium azide and solutions of 5% or greater sodium azide. Use of these materials presents both physical hazards, in the form of explosions, and health hazards, as sodium azide is highly acutely toxic. The Occupational Safety and Health Administration (OSHA) does not have a permissible exposure limit (PEL) for sodium azide or hydrazoic acid. The American Conference of Governmental Industrial Hygienists (ACGIH) recommends a ceiling limit of 0.29 mg/m³ for sodium azide and 0.11 ppm (ceiling) for hydrazoic acid.

The Globally Harmonized System (GHS) classifications for sodium azide are acute toxicity, oral (category 2), acute toxicity, dermal (category 1), acute aquatic toxicity (category 1), and chronic aquatic toxicity (category 1).

Sodium azide can cause hypotension, hypothermia, headache, shortness of breath, faintness, convulsions, and death. It is toxic by all routes of exposure. The oral LD₅₀ (rat) for sodium azide is 27 mg/kg and the skin (rabbit) LD₅₀ is 20 mg/kg. The LC₅₀ (rat) is 37 mg/m³.

Sodium azide rapidly hydrolyzes in water to form hydrazoic acid, a highly toxic and explosive gas. It is thermally unstable, and if heated to ~275°C, sodium azide may undergo violent decomposition.

It can easily form explosive compounds when it comes in contact with or dries on metal surfaces. It can also react with metal pipe in laboratory sinks, traps, and drains and with metal spatulas and lab equipment to form shock sensitive salts.

If sodium azide is introduced to wastewater treatment systems in large volumes or high concentrations, the desirable anti-bacterial characteristics of this chemical can damage the water treatment process.

5. Requirement for Working with Sodium Azide

Sodium azide is considered a particularly hazardous substance (PHS) due to its reactivity and acute toxicity. Consult the safety data sheet (SDS) as well as other sources of information such as the Laboratory Chemical Safety Summary: Sodium Azide, Prudent Practices in the Laboratory (The National Academies Press) and Facts About Sodium Azide, Centers for Disease Control and Prevention for more information about the material.

A. Hazard and Risk Assessments

The PI/laboratory supervisor must be aware of and approve the work performed under their jurisdiction and shall ensure that an appropriate hazard assessment for the use of sodium azide has been conducted. EHS may be consulted to provide assistance in performing hazard assessments.

Each new operation using sodium azide must be evaluated individually because assessment of the level of risk depends on how the substance will be used.

The assessment should ensure appropriate protective measures have been put into place and that the proper level of work authorization has been obtained, before commencing the operation.

B. Hazard Prevention and Control

The hazards of sodium azide can be mitigated by a variety of means including chemical substitution, engineering controls, administrative controls, personal protective equipment, and work practices. The general control measures are discussed in this section. PIs/LSs must develop control measures specific to the particular operation after conducting the appropriate hazards assessment and develop a separate Standard Operating Procedure (SOP) specific to the operation/project.

1. Chemical substitution

Before sodium azide is selected for use in a particular operation/process, the PI/LS should determine if a safer alternative chemical is available and can be used in lieu of sodium azide.

2. Engineering Controls:

If hydrazoic acid or aerosols may be produced, sodium azide (and sodium azide solutions) must be handled in a chemical fume hood or an exhausted biological safety cabinet with negative pressure ductwork.

Aerosols may be produced during any open handling of dry powder and during open or pressurized manipulations of solutions.

The fume hood should have been inspected in the last 12 months. Work should be performed with the sash lowered as much as possible.

3. Designated Area:

Sodium azide must be used in an area that is designated for its use complete with signs indicating that purpose. The area should be wiped down with a soap and water solution after completion of sodium azide use.

4. Personal Protective Equipment

Wear nitrile rubber gloves (minimum thickness of 0.11 mm with a breakthrough time of 480 minutes), lab coat and safety glasses when working with sodium azide.

Change gloves regularly (at least every two hours) and wash your hands when changing. If splashes may occur, wear goggles and a face shield.

In cases where the arms or torso may be exposed to liquid suspensions or dry particles, wear Tyvek sleeves and/or gowns (or other air-tight non-woven textile). Contact lenses should not be worn when using this material.

5. Work Practice Controls

Use a less dangerous product than sodium azide if possible, or purchase in dilute solutions.

If a balance is required that cannot be placed in the fume hood or biosafety cabinet, the user should take a container made of compatible material, including a lid. The sodium azide should be placed in the container in the hood, the container lid secured and then taken to the balance to weigh.

Do not use a metal scoop to transfer the sodium azide. Do not use a HEPA vacuum for cleaning up sodium azide – sodium azide could react with metal inside the vacuum.

Keep containers closed as much as possible. Once work is complete, wipe down the work area with a soap and water solution.

6. Handling and Storage

Sodium azide is incompatible with halogenated hydrocarbons, metals, acids, and acid chlorides. Store it away from these chemicals.

C. Emergency Procedures

In the event of an emergency involving sodium azide, contact the KSU Police Department by dialing extension 6666 (470-578-6666) for the Kennesaw campus or 5555 (678-915-5555) for the Marietta campus.

Be prepared to communicate what the emergency is, how many people are involved and what is the extent of their injuries or illnesses. Remove the person to fresh air. Evacuate adjoining laboratories as necessary. Notify the lab safety coordinator and the PI of the lab.

1. Accidental Exposure to Sodium Azide

If sodium azide or hydrazoic acid has been inhaled, move the victim to fresh air immediately.

If it has been spilled on the skin or clothing, wash the affected area with large amounts of soap and water, using a safety shower or eyewash, as appropriate, for a minimum of 15 minutes. During washing, remove contaminated clothing and footwear. Remove goggles last. Those assisting the victim should wear protective gloves. A disposable laboratory coat, scrubs, or jumpsuit should be available for the exposed individual to wear after using a safety shower.

If sodium azide has contacted the eyes, immediately flush for at least 15 minutes without stopping. Hold upper and lower eyelids open and away from the eyes during irrigation. Do not allow victim to rub eyes or keep eyes closed. Remove contact lenses if possible. (Note: contact lenses should not be worn when working with this material). If necessary, continue flushing with personal eyewash or apply ice water compresses during transport to a medical facility or eye specialist.

Seek medical attention immediately.

If you are sure the victim has ingested sodium azide, do not attempt mouth-to-mouth CPR. When sodium azide is ingested, it mixes with stomach acid and forms hydrazoic acid. Performing mouth-to-mouth CPR on someone who has ingested sodium azide could expose you to hydrazoic acid.

If sodium azide is ingested, do not induce vomiting. Flush mouth immediately and give plenty of water to drink. Never give anything by mouth to an unconscious person. **Seek medical attention immediately.**

Sodium azide exposure requires immediate first aid and medical treatment. Prompt first aid is essential, even if the victim does not exhibit any signs or symptoms or feel any pain.

2. Spill Clean-up

Spill clean-up must be performed by properly trained hazardous material specialists. Do not attempt to clean up a spill of pure sodium azide or a solution of greater than 5% unless you have had special training.

Metal instruments should never be used with sodium azide. Wipe up solutions with chemical absorbent pads. Cover solids with sand, sweep up and place the waste in a non-metal container. Once the spill has been completely absorbed, wipe the area down at least twice using a soap and water solution.

Waste generated from a spill must be handled as hazardous waste.

D. Waste Management

Sodium azide is an acutely toxic waste. As a pure chemical, container residue or spill residue, it carries a P105 hazardous waste code. As a small quantity generator, KSU is allowed to produce up to 1 kg of this type of waste per month. Any amount over that will change the generator status to a large quantity generator with all the regulations thereof. Contaminated packaging will be disposed of as P105 waste.

E. Training Requirements

All faculty/staff/students who work with sodium azide are required to complete the OwlTrain online training course “Laboratory Safety” and the course “Globally Harmonized System of Classification and Labeling of Chemicals (GHS)”.

They are also required to read and fully comply with this SOP for sodium azide. Use the form in Appendix A below to record training for this SOP.

Appendix A: SOP Review Record Form

To be completed by the employee/student

Sodium azide is considered a particularly hazardous substance (PHS) due to its reactivity and acute toxicity. To manage risks associated with use of sodium azide and to ensure the safety of KSU employees and students, the University has established a standard operating procedure (SOP) for the safe handling of sodium azide.

The procedure requires that all faculty/staff/students who work with sodium azide complete the appropriate safety training and read and comply with the SOP for sodium azide. This form, therefore, should be completed and signed by each KSU employee or student who works, or plans to work with sodium azide, as documentation that he/she has read and understood the requirements of the SOP.

Name				<input type="checkbox"/> Faculty <input type="checkbox"/> Staff <input type="checkbox"/> Student
Job Title		Department		
Supervisor's Name				
<i>By signing this form, I certify that I have read, understood, and will comply with the requirements of this SOP</i>				
Signature			Date	
<p><i>Note:</i></p> 				