

Chemical Name: sodium azide

C.A.S. No.: 26628-22-8

Synonyms: azide, azium, Hydrazoic acid sodium salt, U-3886, kazoe, NSC 3072, smite, azoture de sodium (FRENCH), natriumazid (GERMAN), natriummajide (DUTCH), azoturo di sodium (ITALIAN)

Formula: NaN₃

Structure: Na⁺ ⁻N = N⁺ = N⁻ (two crystalline forms are known: rhombohedral and hexagonal)

Description: Colorless to white solid, it is highly toxic to humans and presents a severe explosion risk when shocked or heated. Used as a probe, mutagen, and a preservative in lab sample preps to prevent microbiological growth in laboratory preparations by inhibiting cytochrome oxidase in gram negative bacteria (gram positive bacteria are resistant). It is also used in the preparation of other azides, some energetically favorable (Cu, Pb, Ag).

Hazards: Sodium azide is on the Special Health Hazard Substance List because it is a mutagen. Mutagens may have a cancer risk - sodium azides current status is A4; Not classifiable as a human carcinogen, as sodium azide or as hydrazoic acid vapor. All contact with this substance should be reduced to the lowest possible level. This substance is also on the EPA Hazardous Substance List (P105) and is considered an acutely hazardous waste when discarded as an unused, off specification commercial chemical product, or spill residue. Note that metal shelves and other metal items used to handle sodium azide (i.e., spatulas, plumbing) can also result in the formation of shock sensitive heavy metal azides and thus should be avoided. It is for this reason no azide compounds should be released into plumbing drains. Solid sodium azide can explode from heating or shock. Solutions of sodium azide do not pose the same danger of shock-sensitivity or explosion associated with the solid form, however, the toxic hydrazoic acid is generated and volatizes at room temperature when the sodium azide is dissolved in water.

Emergency Exposure Procedures:

Ingestion

Sodium azide poisoning by ingestion is treated with supportive medical care in a hospital setting. No specific antidote exists for sodium azide poisoning. The most important thing is for victims to seek medical treatment as soon as possible. Call Public Safety at x2111 immediately and request assistance.

Eye/Skin

If your eye or skin is exposed to NaN₃ or HN₃, use the emergency eye wash to immediately flush with large amounts of water for 15 minutes and then seek medical attention. If you swallow or inhale NaN₃, seek medical attention immediately.

Exposure Limits:

OSHA: Vacated 1989 OSHA PEL Ceiling limit 0.1 ppm (as HN3) with skin designation*. A ceiling limit of 0.3 mg/cu m (as NaN3) with skin designation* is still enforced in some U.S. states.

Non-Regulatory:

NIOSH: The recommended airborne exposure limit is 0.11 ppm as hydrazoic acid or 0.3 mg/m³ as sodium azide, which should not be exceeded at any time.

ACGIH: The recommended airborne exposure limit is 0.11 ppm as hydrazoic acid or 0.29 mg/m³ as sodium azide (0.1 ppm Ceiling with skin designation*), which should not be exceeded at any time.

* The above exposure limits are for air levels only. When skin contact also occurs, you may be overexposed, even though air levels are less than the limits listed above.

Storage:

If not dissolved, solid sodium azide should be stored in a secured cabinet because of the extremely low toxicity and shock hazard. Solutions of sodium azide do not pose the danger of shock-sensitivity associated with the solid form. Incompatibles: acid chlorides and halogenated solvents
CONDITIONS TO AVOID: AVOID CONTACT WITH METALS, AVOID CONTACT WITH ACID. HEAT-SENSITIVE. EXPLODES WHEN HEATED – PROTECT FROM THIEFT

Spill Procedures: Solid form: Reclaim any material that can be reused and place in a labeled container. Place all unwanted material into an appropriately sized container not larger than 1kg labeled “*Hazardous Waste – sodium azide crystal (approx mass), spill debris*” including any material used to decontaminate surfaces. Use as many 1Kg containers as needed. Cap securely and store in satellite accumulation area. Liquid Form: Use spill kit, or other absorbent material and place absorbent material into an appropriately sized container not larger than 1Kg in size labeled “*Hazardous Waste – sodium azide (concentration and volume), spill debris*” including any material used to decontaminate surfaces. Use as many 1Kg containers as needed Cap securely and store in satellite accumulation area.

General Precautions:

Take precautions to avoid contact with metals. Take precautions to avoid shock in the solid form. The solution is should prepared inside a laboratory chemical hood to avoid exposure to hydrazoic acid. Hydrazoic acid has similar toxicity as solid sodium azide. Sink disposal of solutions of azide compounds that have not been deactivated must be avoided. Should a release of sodium azide to the lab drains occur, contact the Office of Environmental Health and Safety at X-4300 and flush drain with copious amounts of water to flush down the drain to avoid accumulation of explosive deposits and contact with acids.

Laboratory Supervisor: _____ **Phone #:** _____

Designated Work Area: _____

Work Description / Procedures:

Sodium azide is used primarily as a preservative in buffers and NMR samples to prevent microbiological growth. Azide is used as a mutagen in academic setting to demonstrate mutagenesis.

Detailed Procedures:

(Principal Investigator to insert written experimental protocol)

Experimental Safety Precautions:

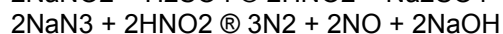
(Principal Investigator to determine by risk assessment based on protocol)

Disposal: Sodium azide is among the P-listed hazardous wastes regulated by the US Environmental Protection Agency. As a discarded commercial chemical product, off specification species, container residues or spill clean up material, it must be managed as a P-coded hazardous waste. Process waste may not carry a p-code. Dilute solutions (5% or less) managed as part of your experiment protocol can be destroyed by reaction with nitrous acid, which is freshly prepared. New York State regulations do not allow sodium azide to be deactivated (treated) outside your experiment and away from the point of generation.

Deactivation step (add as final steps to protocol)

The operation must be carried out in a chemical hood due to the formation of nitric oxide. An aqueous solution not greater than 1L and containing no more than 5% sodium azide is put into an open flask equipped with a stirrer. Using a dropping funnel, add an aqueous solution of sodium nitrite (approximately 20%) containing 1.5 g of sodium nitrite per gram of sodium azide (about 40% excess) with stirring. A 20% aqueous solution of sulfuric acid is then added gradually until the reaction mixture is acidic to pH paper.

The equations are:



Caution:

This order of addition is essential. If the acid is added before the nitrite, poisonous volatile HN_3 will be evolved. When the evolution of nitrogen oxides is over, the acidic solution is tested with potassium iodide-starch paper; if it turns blue, it means that excess nitrite is present and decomposition is complete. Note that the solution must be neutralized with dilute NaOH solution to pH 6-9 prior to discharge once at a neutral pH, the reaction mixture can safely be washed down the drain.

All personnel involved in deactivating sodium azide shall conduct inspections, maintenance or other activities to ensure that the process does not result in spills, leaks, or emissions into the environment prior to deactivation of the material.

Detection of sodium azide (qualitative test)

The following colorimetric testing can be used to detect NaN_3 in your used solution: A drop of the solution is placed in the depression of a spot plate and treated with 1 or 2 drops of dilute hydrochloric acid. A drop of ferric chloride solution is added and the spot plate gently heated. A red color indicates hydrazoic acid and thus the presence of sodium azide in the solution.

Authorized Personnel

List all authorized Personnel and their training in the use of sodium azide:

Name	Training	Signature
_____	_____	_____
_____	_____	_____
_____	_____	_____

References:

Centers for Disease Control and Prevention (CDC), [National Institute for Occupational Safety and Health \(NIOSH\), Pocket Guide to Chemical Hazards.](#)

Generic NaN₃ MSDS:

http://aben.cals.cornell.edu/bmb_lab/msds/naazide.html

Northeastern University Fact sheet:

http://www.ehs.neu.edu/hazardous_waste/fact_sheets/sodium_azide/