Sodium Azide Hazards and Disposal

Sodium azide is used at UNO in the preservation of samples and stock solutions. It is often a better choice for this purpose than thimerosal, as sodium azide does not contain mercury. However, sodium azide does have hazards.

Heavy-metal azides are notoriously explosive. Sodium azide, a common preservative in clinical laboratories and a useful reagent in synthetic work, is not explosive except when heated near its decomposition temperature (300 C); heating sodium azide should be avoided. Sodium azide should never be flushed down the drain since this practice can cause serious incidents when the azide reacts with lead or copper in the drain lines and explodes. Moreover, sodium azide has high acute toxicity as well as high toxicity to bacteria in water treatment plants.[1]

Note that metal shelves and other metal items used to handle sodium azide (i.e., spatulas) can also result in the formation of heavy metal azides and thus should be avoided. Sodium azide solutions can be submitted to Environmental Health & Safety for disposal, or be chemically degraded in the laboratory using the following method:

Sodium azide can be destroyed by reaction with nitrous acid.

$$2NaN_3 + 2HNO_2 \; 3N_2 + 2NO + 2NaOH$$

The operation must be carried out in a hood due to the formation of nitric oxide. An aqueous solution containing no more than 5% sodium azide is put into a three-necked flask equipped with a stirrer, a dropping funnel, and an outlet with plastic tubing to carry nitrogen oxides to the hood flue. A 20% aqueous solution of sodium nitrite containing 1.5 g (about 40% excess) of sodium nitrite per gram of sodium azide is added with stirring. A 20% aqueous solution of sulfuric acid is then added gradually until the reaction mixture is acidic to litmus paper. (CAUTION: This order of addition is essential. If the acid is added before the nitrile, poisonous volatile HN_3 will be evolved.) When the evolution of nitrogen oxides ceases, the acidic solution is tested with starch-iodide paper; if it turns blue, excess nitrite is present and decomposition is complete. The reaction mixture is washed down the drain. [1]

The solution must be neutralized to pH 6-9 prior to discharge.

[1]Excerpt from Prudent Practices for Disposal of Chemicals From Laboratories, 1991, pages 87-88.