OEHHA

Sodium

DEPARTMENT OF TOXIC SUBSTANCES CONTROL

Vol. 1, No. 6: Clandestine Drug Labs/ Methamphetamine September 2003

Recognizing Sodium

Appearance: Sodium is a soft, silvery, solid metal that can readily be cut with a knife. Lustrous when freshly cut (Figure 1, A.1.), it rapidly tarnishes to a dull gray in air (Figure 1, A.2.). Sodium may develop an outer crust of sodium oxide, which may appear sponge-like. Sodium dissolves in liquid anhydrous ammonia forming a blue solution. At higher concentrations, these solutions are copper colored and have a metallic luster.

Odor & Odor Threshold: Not applicable. Sodium is odorless.

Odor Safety Class: Not applicable. Sodium is odorless.

Vapor Density: Not applicable. Sodium is not volatile.

Containers & Packaging

Commercial: Sodium is available from commercial labs in the form of ingots, lumps, or sticks. It is packaged in containers filled with mineral spirits or kerosene, or packaged under nitrogen. It is also sold as 30-40% dispersions in toluene, mineral spirits, light oil, or paraffin wax. Operators of clandestine drug laboratories may produce "homemade" sodium by electrolysis of sodium hydroxide. The most common commercial source of sodium hydroxide is Red Devil® lye (Figure 1, B.).

Pharmaceutical: There are no pharmaceutical uses of elemental sodium.

Figure 1: Pure sodium is soft, silvery in color, and shiny when first cut **[A.1.]**. Pure sodium rapidly forms a dull gray oxidation crust when exposed to air **[A.2.]**. Sodium metal can be obtained from electrolysis of sodium hydroxide containing products like the drain cleaner shown here **[B]**. *Photographers, Charles Salocks and Caron Poole.*

Role in Drug Synthesis

Elemental sodium, an alkali metal, is used as a catalyst in the anhydrous ammonia / alkali metal "Nazi" method of methamphetamine synthesis to convert the precursor ephedrine or pseudoephedrine product to methamphetamine.

Health Hazards

General: Sodium metal reacts with water to produce highly caustic sodium hydroxide (NaOH), which can cause severe chemical burns resulting in permanent damage to all biological tissues. Reaction of sodium with water also generates heat which may result in thermal burns. NaOH is effectively neutralized by contact with tissue and does not produce systemic toxicity. Short-term contact with small amounts of sodium, followed by rapid recovery, is not likely to cause long-term effects.

Inhalation Exposure: Inhalation of vapors is not a typical route of exposure to solid sodium. Inhalation of finally divided solid particles or liquid suspensions could produce burns in the nose, mouth, throat, and upper respiratory tract.

Skin (Dermal) Exposure: Direct contact with sodium can cause deep, serious burns which appear soft and moist and are very painful. Less severe exposures result in inflammation, redness, and swelling of the skin. Irritation may become apparent within minutes of exposure. Fatalities have occurred following contact with finely divided sodium dispersed in hydrocarbon solvents such as mineral oil or toluene.

Eye Contact: Direct eye contact can result in serious burns. Formation of lesions, destruction of cells and tissue, inflammation, and opacification of the cornea may result. Ulcerations may progress for several days following exposure. Potential effects include cataracts, glaucoma, adhesion of the eyelid to the eye, blindness, and eye loss.

Ingestion: Once ingested, sodium will react vigorously with saliva in the mouth and esophagus to produce severe chemical and thermal burns of the mouth, esophagus, and stomach. Symptoms of serious injury to the esophagus include constricted airways, vomiting, drooling, and abdominal pain.

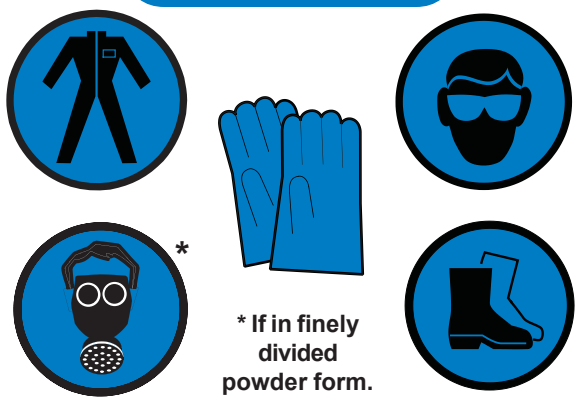
Clandestine Labs/ "Meth": Sodium

Environmental Concerns

General: Elemental sodium reacts immediately with water and a number of organic compounds to form sodium hydroxide (NaOH) and hydrogen gas (H_2). Unless it is protected from contact with moisture, sodium is unlikely to persist in the environment. Typically only small amounts of elemental sodium are needed for methamphetamine synthesis. Wastes generated by small scale clandestine methamphetamine labs are unlikely to contain sufficient amounts of sodium to result in significant contamination of air, soil, surface water, or ground water.

Indoors: Sodium may form an outer layer of solid NaOH on surfaces, which can remain very reactive and hazardous. Because of the formation of NaOH, corrosion and destruction of surfaces may be apparent in areas where sodium was spilled. If accessible surfaces were contaminated with sodium and resulting NaOH, potential routes of exposure include direct skin contact and ingestion resulting from hand-to-mouth activity.

Handling & Safety



Chemical Hazards

Reactivity: Sodium reacts violently with water, including moisture in the air, and dilute acids to form caustic NaOH and highly flammable hydrogen gas. The reaction generates considerable heat, melting the sodium and frequently igniting the hydrogen gas. Sodium reacts explosively with dilute sulfuric acid. It also reacts with organic compounds containing oxygen, nitrogen, sulfur, fluorine, chlorine and bromine, carboxyl, or hydroxyl groups. In general, finely divided sodium reacts much more quickly and more vigorously than large pieces of sodium.

Flammability: Sodium ignites spontaneously if heated to temperatures above 120°C (250°F). Finely divided sodium may ignite at much lower temperatures. Since sodium melts at 98°C, transition from a solid to a liquid is an indication that sodium is approaching its auto-ignition temperature. Combustion of sodium produces sodium oxide smoke, which is hazardous and highly irritating.

Chemical Incompatibilities: Water and organic compounds containing reactive groups noted above.

First Aid

General: If exposed to sodium metal, in general it is critically important to seek medical attention immediately.

Inhalation Exposure: Move to fresh air. If victim has difficulty breathing, give oxygen. If victim is not breathing, give artificial respiration. Keep victim in a half upright position.

Contact with Clothing or Skin (Dermal Exposure): Remove contaminated clothing. Flush exposed areas with water for 15 minutes or more and wash thoroughly when possible. Treat burns as directed by medical personnel.

Contact with Eyes: Flush exposed eyes with water for at least 15 minutes. Remove contact lenses if possible.

Ingestion (Oral) Exposure: Do not induce vomiting. Conscious victims should be given water.

Special Concerns for Children: Toxic effects may be greater since gastric acid in children is not strong enough or present in great enough amounts to neutralize even small amounts of strongly alkaline compounds. Children may not recognize the dangers associated with chemical contact and may therefore be more susceptible to accidental and/or purposeful exposures. Children may think pure sodium metal is food since it may be confused with cream cheese or even chewing gum.

Exposure Limits

Occupational Exposure Limits (NIOSH, OSHA, & ACGIH)
Short-Term Exposure Limit (STEL): not established
8-Hr Time Weighted Average (TWA): not established
10-Hr Time Weighted Average (TWA): not established
Immediately Dangerous (IDLH): not established

Preliminary Remediation Goals (PRGs) (U.S. EPA, Reg. 9):
Air, Soil, & Water: not established

More Information

Office of Environmental Health Hazard Assessment (OEHHA)
www.OEHHA.CA.Gov

Department of Toxic Substances Control (DTSC)
www.DTSC.CA.Gov

Authors: Karlyn Black Kaley, PhD, DABT & Charles Salocks, PhD, DABT • Graphic Design: Karlyn Black Kaley, PhD, DABT