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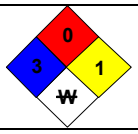

Sodium Hydroxide Facts

Texas Hazardous Substances Emergency Events Surveillance (HSEES) System

Sodium hydroxide: A very corrosive odorless white solid, also known as sodium hydrate, lye, caustic soda, and white caustic that can harm you if you eat it, breath aerosols/mists into your lungs, or get it on your skin, into your eyes, or on mucous membranes such as your nose and mouth.

Incompatible Chemical Groups:

Reacts with	May Produce
Aluminum, tin, lead, and zinc metals	Hydrogen gas
Ammonium salts	Ammonia gas
Strong acids	Violent reactions
Flammable liquids	Unstable, explosive byproducts
Organic peroxides, organic halides	Unstable, explosive byproducts
Nitromethane and other nitro compounds	Unstable, explosive byproducts
Moisture or water	Heat

Releases in Texas: Texas is one of 15 states participating in the Hazardous Substances Emergency Events Surveillance (HSEES) system. The goal of HSEES is to identify preventable events to reduce injury and death from acute releases of hazardous substances. The Texas Department of State Health Services collects and analyzes data on acute releases of non-petroleum hazardous substances greater than one gallon or 10 pounds. All releases of CERCLA substances with a reportable quantity of one pound also are included. Threatened releases that result in an evacuation or other public health actions are included as well. From 1993 to 2004, Texas HSEES collected information on 28,191 HSEES events.

Sodium Hydroxide Events: There were 516 actual or threatened releases of sodium hydroxide in Texas from 1993-2004: 370 fixed-facility events and 146 transportation events. These included releases classified as sodium hydroxide, sodium hydroxide not otherwise specified (NOS), and caustic soda releases. The industries most frequently associated with sodium hydroxide events were manufacturing (275), followed by transportation (169), and utilities (29). Nine of the events resulted in the evacuation of more than 167 people; the number of people evacuated for any single event ranged from 1 to 42. Evacuations lasted from 1 to 8 hours. Sixty-four people needed to be decontaminated in 21 events.

Events with Injuries: A total of 308 people were injured in 29 sodium hydroxide release events (6% of all releases). Eighty-five percent of the injuries occurred to members of the general public. The transportation industry had the most events involving victims (10); however, 82% of the injuries occurred in events involving the utilities industry. One utility industry event involved excess sodium hydroxide entering the city's water system, injuring 251 people. Chemical burns, skin irritation, and nausea were the most frequently reported injuries. Forty-one workers and 4 first responders were injured in sodium hydroxide-related events. Injured workers most often reported chemical burns. First responders most often reported chemical burns and eye irritation. First responders also reported fire-fighting injuries such as thermal burns, heat stress, and trauma, which were unrelated to sodium hydroxide exposures. One member of the public died in an event involving the release of sodium hydroxide. Most of the victims (86%) were treated at the hospital and released.

Preventing sodium hydroxide releases

Primary Lines of Defense: Engineering controls and workplace practices are the primary lines of defense to prevent or reduce events involving sodium hydroxide. In addition, plans to help prevent hazardous chemical releases that affect workers' health and safety, communities around a facility, and the environment may be developed and used. Some of the primary lines of defense include:

Engineering Control Measures: Plant managers can work together with process engineers and industrial hygienists to anticipate potential system failures or releases by evaluating critical process weaknesses and process performance limits, and by reviewing past releases. Engineering controls should be designed to help contain process materials or byproducts near their point of emission; before they reach workers or nearby residents. Examples of control measures used in industrial plants and chemical storage facilities include:

- Isolation or containment vessels that recapture released products.
- Backup systems for failed primary equipment (pumps, valves, emergency generators).
- Exhaust ventilation fans to reduce exposures to workers.
- Automated sensors linked to cutoff systems to prevent chemical releases.

Workplace Practices: Examples of standardized procedures that can minimize releases and reduce worker exposures include:

- Equipment surveys and regular maintenance schedules to detect, replace, and repair equipment.
- Checklists to prepare for, monitor, and minimize process upsets during bad weather, shutdowns, and startups.
- Evacuation plans and frequent drills with workers to help workers in process/storage areas get a safe distance away from a release.
- Procedures for the proper storage and disposal of *basic* and acidic chemicals

Secondary Line of Defense: The use of personal protective equipment (PPE) is the second line of defense in reducing worker exposures. Using routine safety PPE like hard hats, safety glasses and shoes, uniforms, and gloves helps diminish injury to employees exposed to routine health and safety workplace hazards. Some examples of PPE include:

Skin protection: Wear durable, base-resistant gloves, and clothing. Natural and synthetic rubbers, nitrile, and other synthetic products are effective glove materials against this chemical. NIOSH recommends neoprene, polyvinyl chloride (PVC), and Barricade™ materials as a resistant barrier to hydroxide in protective clothing. Structural firefighter protective clothing provides limited protection in fire situations, and may not be effective in all spill situations.

Eye protection: When working with solids, wear impact resistant eye protection with side shields or goggles. When working with liquids wear indirect-vent, impact and splash resistant goggles and avoid wearing contact lenses.

Respiratory protection: Equipment that protects your lungs (respirators) and respiratory system may be necessary when primary control measures fail; however, they only should be used under appropriate conditions by trained personnel. It is critical that air-purifying and supplied-air respirators be individually fit tested, well maintained, equipped with proper cartridges or air cylinders, and stored in an accessible area in the event of an emergency. Each worker must be evaluated regularly by a physician to determine if they can safely don and work in a respirator. In

specific circumstances, respirators may provide effective protection for one of the workers' most vulnerable yet vital organ systems.

- In normal work environments, wear an air-purifying or supplied-air respirators with high efficiency particulate/dust-mist filters (HEPA or P100) and a full face piece. For increased protection, wear any SCBA operated in a pressure-demand or other positive-pressure modes
- When the exposure levels are unknown, wear a self-contained breathing apparatus (SCBA) with full face piece operated in a pressure-demand or other positive-pressure mode.
- In escape situations, wear a SCBA or a full-face air-purifying respirator with high-efficiency particulate filters (HEPA or P100).

Actions to take if there is a spill or release

Dependent on spill size and chemical concentration you may need to:

- Evacuate 80 to 160 feet in all directions, or if a fire/explosion threat consider ½ mile.
- Stay up wind.
- Stop the leak, if you can do so without risk to yourself or others. Ventilate the area.
- Absorb or cover spills with dry earth, sand, or other non-combustible material and transfer to unbreakable containers for proper disposal. Do NOT use organic materials like paper towels.
- Keep out of confined, enclosed spaces such as sewers and basements.
- In case of fire, use carbon dioxide, dry chemical, dry sand, or an alcohol-resistant foam.
- If firefighting, stay a maximum distance or use unmanned hose holders or monitor nozzles.
- Dike fire control water for later recovery and proper disposal since it may be corrosive, toxic, or contain other hazards.
- Cool the containers with flooding quantities of water until the fire is out.
- Don't get water inside containers.
- Stay away from tanks engulfed in fire.
- Withdraw immediately if you hear a rising sound from venting safety devices or tank becomes discolored.

Emergency First Aid Measures:

Eye Contact:

1. Immediately flush eyes with large amounts of water. Continue for at least 30 minutes, lifting upper and lower eye lids.
2. Seek medical attention immediately.

Skin Contact:

1. Quickly remove and isolate contaminated clothing.
2. Immediately wash skin with large amounts of mild soap and water for at least 20 minutes.
3. Seek medical attention immediately.

Respiratory:

1. Remove the victim from the site of the release to fresh air.
2. If breathing has stopped, begin rescue breathing using universal precautions, and CPR if heart activity has stopped.
3. Transfer the victim promptly to a medical facility.
4. Observation is recommended for up to 48 hours, as swelling and fluid in the lungs (pulmonary edema) may have delayed onset.

For more information about Texas HSEES, call 512-458-7220.

This fact sheet does not replace the material safety data sheet (MSDS) required for a hazardous chemical under the Occupational Health and Safety Act of 1970 (29 U.S.C. 651 ET SEQ.) and regulations promulgated under this Act. This publication is supported by funds from the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) trust fund and the Office of Terrorism Preparedness and Emergency Response of the Centers for Disease Control and Prevention (CDC), provided to the Texas DSHS under a cooperative agreement by the Agency For Toxic Substances and Disease Registry (ATSDR), Public Health Service, U.S. Department of Health and Human Services. Its contents are solely the responsibility of the authors and do not necessarily represent the official views of ATSDR. Texas HSEES is administered with federal funds totaling $198,639.00 which account for100% of the program's annual budget.