Sodium Hydroxide, Pellets

Material Safety Data Sheet

Hazard Alert Code Key:
- **EXTREME**
- **HIGH**
- **MODERATE**
- **LOW**

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

**PRODUCT NAME**
Sodium Hydroxide, Pellets

**STATEMENT OF HAZARDOUS NATURE**

**SUPPLIER**
Company: Santa Cruz Biotechnology, Inc.
Address:
2145 Delaware Ave
Santa Cruz, CA 95060
Telephone: 800.457.3801 or 831.457.3800
Emergency Tel: CHEMWATCH: From within the US and Canada: 877-715-9305
Emergency Tel: From outside the US and Canada: +800 2436 2255 (1-800-CHEMCALL) or call +613 9573 3112

**PRODUCT USE**
Component of alkali cleaners. Manufacture of soap, pulp and paper; rayon. Chemical manufacture. Neutralising agent in petroleum refining; manufacture of aluminium, detergents, textile processing, refining of vegetable oils. Laboratory reagent, for organic fusion, etching of metal. Used for regenerating ion exchange resins, lye peeling of fruits and vegetables in the food industry.

**SYNONYMS**

Section 2 - HAZARDS IDENTIFICATION

**CANADIAN WHMIS SYMBOLS**

**EMERGENCY OVERVIEW**
**RISK**
Causes severe burns.
Risk of serious damage to eyes.

**POTENTIAL HEALTH EFFECTS**

**ACUTE HEALTH EFFECTS**
SWALLOWED
- The material can produce severe chemical burns within the oral cavity and gastrointestinal tract following ingestion.
- Ingestion of alkaline corrosives may produce burns around the mouth, ulcerations and swellings of the mucous membranes, profuse saliva production, with an inability to speak or swallow. Both the esophagus and stomach may experience burning pain; vomiting and diarrhea may follow. Epiglottal swelling may result in respiratory distress and asphyxia; shock can occur. Narrowing of the esophagus, stomach or stomach valve may occur immediately or after a long delay (weeks to years). Severe exposure can perforate the esophagus or stomach leading to infections of the chest or abdominal cavity, with low chest pain, abdominal stiffness and fever. All of the above can cause death.
- Accidental ingestion of the material may be damaging to the health of the individual.
- Ingestion of sodium hydroxide may result in severe burns to the mouth, throat and stomach, pain, nausea and vomiting, swelling of the larynx and subsequent suffocation, perforation of the gastro-intestinal tract. A 1% aqueous solution (pH 13.4) of sodium hydroxide failed to cause gastric, oesophageal or other damage in rabbits.

EYE
- The material can produce severe chemical burns to the eye following direct contact. Vapors or mists may be extremely irritating.
- If applied to the eyes, this material causes severe eye damage.
- Direct eye contact with corrosive bases can cause pain and burns. There may be swelling, epithelium destruction, clouding of the cornea and inflammation of the iris. Mild cases often resolve; severe cases can be prolonged with complications such as persistent swelling, scarring, permanent cloudiness, bulging of the eye, cataracts, eyelids glued to the eyeball and blindness.

SKIN
- The material can produce severe chemical burns following direct contact with the skin.
- The material may cause moderate inflammation of the skin either following direct contact or after a delay of some time.
- Repeated exposure can cause contact dermatitis which is characterized by redness, swelling and blistering.
- Skin contact is not thought to have harmful health effects, however the material may still produce health damage following entry through wounds, lesions or abrasions.
- Sodium hydroxide burns are not immediately painful; onset of pain may be delayed minutes or hours; thus care should be taken to avoid contamination of gloves and boots.
- A 5% aqueous solution of sodium hydroxide applied to the skin of rabbits for 4 hours produced severe necrosis. Instillation of a 1% solution into the conjunctival sac failed to produce ocular or conjunctival injury in rabbits provided the eye was promptly irrigated with copious amounts of water.
- Skin contact with alkaline corrosives may produce severe pain and burns; brownish stains may develop. The corroded area may be soft, gelatinous and necrotic; tissue destruction may be deep.
- Open cuts, abraded or irritated skin should not be exposed to this material.
- Entry into the blood-stream, through, for example, cuts, abrasions or lesions, may produce systemic injury with harmful effects. Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.

INHALED
- The material can cause respiratory irritation in some persons. The body's response to such irritation can cause further lung damage.
- Inhaling corrosive bases may irritate the respiratory tract. Symptoms include cough, choking, pain and damage to the mucous membrane. In severe cases, lung swelling may develop, sometimes after a delay of hours to days. There may be low blood pressure, a weak and rapid pulse, and cracking sounds.
- Severe acute sodium hydroxide dust inhalation exposure may be fatal due to spasm, inflammation and oedema of the larynx and bronchi, chemical pneumonitis and severe pulmonary oedema.
- Symptoms of overexposure include burning sensation, coughing, wheezing, laryngitis, shortness of breath, headache, nausea and vomiting.
- Persons with impaired respiratory function, airway diseases and conditions such as emphysema or chronic bronchitis, may incur further disability if excessive concentrations of particulate are inhaled.

CHRONIC HEALTH EFFECTS
- Repeated or prolonged exposure to corrosives may result in the erosion of teeth, inflammatory and ulcerative changes in the mouth and necrosis (rarely) of the jaw. Bronchial irritation, with cough, and frequent attacks of bronchial pneumonia may ensue. Gastrointestinal disturbances may also occur. Chronic exposures may result in dermatitis and/or conjunctivitis.
- Long-term exposure to respiratory irritants may result in disease of the airways involving difficult breathing and related systemic problems. Limited evidence suggests that repeated or long-term occupational exposure may produce cumulative health effects involving organs or biochemical systems.
- Long-term exposure to high dust concentrations may cause changes in lung function i.e. pneumoconiosis; caused by particles less than 0.5 micron penetrating and remaining in the lung. Prime symptom is breathlessness; lung shadows show on X-ray.

### Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

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<th>Max</th>
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<tr>
<th>NAME</th>
<th>CAS RN</th>
<th>%</th>
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<tr>
<td>sodium hydroxide</td>
<td>1310-73-2</td>
<td>&gt;98</td>
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</table>

### Section 4 - FIRST AID MEASURES

**SWALLOWED**
For advice, contact a Poisons Information Center or a doctor at once.
Urgent hospital treatment is likely to be needed.
If swallowed do NOT induce vomiting.
If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration.
Observe the patient carefully.
Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious.
Give water to rinse out mouth, then provide liquid slowly and as much as casually can comfortably drink.
Transport to hospital or doctor without delay.

EYE
- If this product comes in contact with the eyes:
  - Immediately hold eyelids apart and flush the eye continuously with running water.
  - Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.
  - Continue flushing until advised to stop by the Poisons Information Center or a doctor, or for at least 15 minutes.
  - Transport to hospital or doctor without delay.
- Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

SKIN
- If skin or hair contact occurs:
  - Immediately flush body and clothes with large amounts of water, using safety shower if available.
  - Quickly remove all contaminated clothing, including footwear.
  - Wash skin and hair with running water. Continue flushing with water until advised to stop by the Poisons Information Center.
  - Transport to hospital, or doctor.

INHALED
- If fumes or combustion products are inhaled remove from contaminated area.
  - Lay patient down. Keep warm and rested.
  - Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures.
  - Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary.
  - Transport to hospital, or doctor, without delay.
Inhalation of vapors or aerosols (mists, fumes) may cause lung edema. Corrosive substances may cause lung damage (e.g. lung edema, fluid in the lungs). As this reaction may be delayed up to 24 hours after exposure, affected individuals need complete rest (preferably in semi-recumbent posture) and must be kept under medical observation even if no symptoms are (yet) manifested. Before any such manifestation, the administration of a spray containing a dexamethasone derivative or beclomethasone derivative may be considered. This must definitely be left to a doctor or person authorized by him/her.

NOTES TO PHYSICIAN
- For acute or short-term repeated exposures to highly alkaline materials:
  - Respiratory stress is uncommon but present occasionally because of soft tissue edema.
  - Unless endotracheal intubation can be accomplished under direct vision, cricothyroidotomy or tracheotomy may be necessary.
  - Oxygen is given as indicated.
  - The presence of shock suggests perforation and mandates an intravenous line and fluid administration.
  - Damage due to alkaline corrosives occurs by liquefaction necrosis whereby the saponification of fats and solubilization of proteins allow deep penetration into the tissue.
  - Alkalis continue to cause damage after exposure.

INGESTION:
- Milk and water are the preferred diluents
- No more than 2 glasses of water should be given to an adult.
- Neutralizing agents should never be given since exothermic heat reaction may compound injury.
- Catharsis and emesis are absolutely contra-indicated.
- Activated charcoal does not absorb alkali.
- Gastric lavage should not be used.
- Supportive care involves the following:
  - Withhold oral feedings initially.
  - If endoscopy confirms transmucosal injury start steroids only within the first 48 hours.
  - Carefully evaluate the amount of tissue necrosis before assessing the need for surgical intervention.
  - Patients should be instructed to seek medical attention whenever they develop difficulty in swallowing (dysphagia).

SKIN AND EYE:
- Injury should be irrigated for 20-30 minutes.
- Eye injuries require saline. [Ellenhorn & Barceloux: Medical Toxicology]

### Section 5 - FIRE FIGHTING MEASURES

<table>
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<tr>
<th>Property</th>
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<td>Vapour Pressure (mmHG)</td>
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<td>Upper Explosive Limit (%)</td>
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<td>Specific Gravity (water=1)</td>
<td>2.12 @ 20 C</td>
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<tr>
<td>Lower Explosive Limit (%)</td>
<td>Not applicable</td>
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</table>

### EXTINGUISHING MEDIA
- Water spray or fog.
- Foam.
- Dry chemical powder.
- BCF (where regulations permit).
- Carbon dioxide.

**FIRE FIGHTING**
- Alert Emergency Responders and tell them location and nature of hazard.
- Wear full body protective clothing with breathing apparatus.
- Prevent, by any means available, spillage from entering drains or water course.
- Use fire fighting procedures suitable for surrounding area.
- DO NOT approach containers suspected to be hot.
- Cool fire exposed containers with water spray from a protected location.
- If safe to do so, remove containers from path of fire.
- Equipment should be thoroughly decontaminated after use.

**GENERAL FIRE HAZARDS/HAZARDOUS COMBUSTIBLE PRODUCTS**
- Non combustible.
- Not considered to be a significant fire risk, however containers may burn.
- Decomposition may produce toxic fumes of: metal oxides.
- May emit corrosive fumes.

**FIRE INCOMPATIBILITY**
- None known.

**PERSONAL PROTECTION**
- Glasses: Chemical goggles.
- Full face-shield.
- Gloves:
  1. BUTYL
  2. NAT+NEOPR+NITRILE
- Respirator: Particulate

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**Section 6 - ACCIDENTAL RELEASE MEASURES**

**MINOR SPILLS**
- Remove all ignition sources.
- Clean up all spills immediately.
- Avoid contact with skin and eyes.
- Control personal contact by using protective equipment.
- Use dry clean up procedures and avoid generating dust.
- Place in a suitable, labelled container for waste disposal.
- Drains for storage or use areas should have retention basins for pH adjustments and dilution of spills before discharge or disposal of material.
- Check regularly for spills and leaks.

**MAJOR SPILLS**
- Clear area of personnel and move upwind.
- Alert Emergency Responders and tell them location and nature of hazard.
- Wear full body protective clothing with breathing apparatus.
- Prevent, by any means available, spillage from entering drains or water course.
- Consider evacuation.
- Stop leak if safe to do so.
- Contain spill with sand, earth or vermiculite.
- Collect recoverable product into labeled containers for recycling.
- Neutralize/decontaminate residue.
- Collect solid residues and seal in labeled drums for disposal.
- Wash area and prevent runoff into drains.
- After clean up operations, decontaminate and launder all protective clothing and equipment before storing and re-using.
- If contamination of drains or waterways occurs, advise emergency services.

**PROTECTIVE ACTIONS FOR SPILL**
PROTECTIVE ACTION ZONE

Isolation Distance 25 meters
Downwind Protection Distance 250 meters

FOOTNOTES

1 PROTECTIVE ACTION ZONE is defined as the area in which people are at risk of harmful exposure. This zone assumes that random changes in wind direction confines the vapour plume to an area within 30 degrees on either side of the predominant wind direction, resulting in a crosswind protective action distance equal to the downwind protective action distance. 2 PROTECTIVE ACTIONS should be initiated to the extent possible, beginning with those closest to the spill and working away from the site in the downwind direction. Within the protective action zone a level of vapour concentration may exist resulting in nearly all unprotected persons becoming incapacitated and unable to take protective action and/or incurring serious or irreversible health effects.
3 INITIAL ISOLATION ZONE is determined as an area, including upwind of the incident, within which a high probability of localised wind reversal may expose nearly all persons without appropriate protection to life-threatening concentrations of the material.
4 SMALL SPILLS involve a leaking package of 200 litres (55 US gallons) or less, such as a drum (jerrican or box with inner containers). Larger packages leaking less than 200 litres and compressed gas leaking from a small cylinder are also considered "small spills". LARGE SPILLS involve many small leaking packages or a leaking package of greater than 200 litres, such as a cargo tank, portable tank or a "one-tonne" compressed gas cylinder.
6 IERG information is derived from CANUTEC - Transport Canada.

ACUTE EXPOSURE GUIDELINE LEVELS (AEGL) (in ppm)

AEGL 1: The airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience notable discomfort, irritation, or certain asymptomatic nonsensory effects. However, the effects are not disabling and are transient and reversible upon cessation of exposure.
AEGL 2: The airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience irreversible or other serious, long-lasting adverse health effects or an impaired ability to escape.
AEGL 3: The airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience life-threatening health effects or death.

EMERGENCY RESPONSE PLANNING GUIDELINES (ERPG)
The maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to one hour WITHOUT experiencing or developing

life-threatening health effects is:
- sodium hydroxide 50mg/m³

irreversible or other serious effects or symptoms which could impair an individual's ability to take protective action is:
- sodium hydroxide 5mg/m³

other than mild, transient adverse effects without perceiving a clearly defined odour is:
- sodium hydroxide 0.5mg/m³

American Industrial Hygiene Association (AIHA)

Ingredients considered according exceed the following cutoffs

<table>
<thead>
<tr>
<th>Very Toxic (T+)</th>
<th>Toxic (T)</th>
<th>Corrosive (C)</th>
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<tr>
<td>&gt;= 0.1%</td>
<td>&gt;= 3.0%</td>
<td>&gt;= 5.0%</td>
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<tr>
<td>R50</td>
<td>R51</td>
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<tr>
<td>&gt;= 10%</td>
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where percentage is percentage of ingredient found in the mixture

Section 7 - HANDLING AND STORAGE

PROCEDURE FOR HANDLING

- Avoid all personal contact, including inhalation.
- Wear protective clothing when risk of exposure occurs.
- Use in a well-ventilated area.
- WARNING: To avoid violent reaction, ALWAYS add material to water and NEVER water to material.
- Avoid smoking, naked lights or ignition sources.
- Avoid contact with incompatible materials.
- When handling, DO NOT eat, drink or smoke.
- Keep containers securely sealed when not in use.
Avoid physical damage to containers.
Always wash hands with soap and water after handling.
Work clothes should be laundered separately.
Launder contaminated clothing before re-use.
Use good occupational work practice.
Observe manufacturer's storing and handling recommendations.
Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained.

RECOMMENDED STORAGE METHODS

- Glass container.
- DO NOT use aluminium, galvanised or tin-plated containers
- Lined metal can, Lined metal pail/drum
- Plastic pail
- Polyliner drum
- Packing as recommended by manufacturer.
- Check all containers are clearly labeled and free from leaks.
For low viscosity materials
- Drums and jerricans must be of the non-removable head type.
- Where a can is to be used as an inner package, the can must have a screwed enclosure.
For materials with a viscosity of at least 2680 cSt. (23 deg. C) and solids (between 15 C deg. and 40 deg C.):
- Removable head packaging;
- Cans with friction closures and
- low pressure tubes and cartridges may be used.
- Where combination packages are used, and the inner packages are of glass, porcelain or stoneware, there must be sufficient inert cushioning material in contact with inner and outer packages unless the outer packaging is a close fitting molded plastic box and the substances are not incompatible with the plastic.

STORAGE REQUIREMENTS

- Plastic bag
- NOTE: Bags should be stacked, blocked, interlocked, and limited in height so that they are stable and secure against sliding or collapse.
- Store in original containers.
- Keep containers securely sealed.
- Store in a cool, dry, well-ventilated area.
- Store away from incompatible materials and foodstuff containers.
- Protect containers against physical damage and check regularly for leaks.
- Observe manufacturer's storing and handling recommendations.
- DO NOT store near acids, or oxidizing agents.
- No smoking, naked lights, heat or ignition sources.

SAFE STORAGE WITH OTHER CLASSIFIED CHEMICALS

X: Must not be stored together
O: May be stored together with specific preventions
+: May be stored together

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS

<table>
<thead>
<tr>
<th>Source</th>
<th>Material (Sodium hydroxide)</th>
<th>TWA ppm</th>
<th>TWA mg/m³</th>
<th>STEL ppm</th>
<th>STEL mg/m³</th>
<th>Peak ppm</th>
<th>Peak mg/m³</th>
<th>TWA F/C</th>
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</tbody>
</table>

### MATERIAL DATA

**SODIUM HYDROXIDE:**
- for sodium hydroxide:
  - The TLV-C is recommended based on concentrations that produce noticeable but not excessive, ocular and upper respiratory tract irritation.

### PERSONAL PROTECTION

Consult your EHS staff for recommendations

**EYE**
Chemical goggles.
• Full face shield.
• Contact lenses pose a special hazard; soft contact lenses may absorb irritants and all lenses concentrate them.

HANDS/FEET
• Elbow length PVC gloves.
Suitability and durability of glove type is dependent on usage. Important factors in the selection of gloves include: such as:
• frequency and duration of contact,
• chemical resistance of glove material,
• glove thickness and
• dexterity
Select gloves tested to a relevant standard (e.g. Europe EN 374, US F739).
• When prolonged or frequently repeated contact may occur, a glove with a protection class of 5 or higher (breakthrough time greater than 240 minutes according to EN 374) is recommended.
• When only brief contact is expected, a glove with a protection class of 3 or higher (breakthrough time greater than 60 minutes according to EN 374) is recommended.
• Contaminated gloves should be replaced.
Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturiser is recommended.

OTHER
• Overalls.
• PVC Apron.
• PVC protective suit may be required if exposure severe.
• Eyewash unit.
• Ensure there is ready access to a safety shower.
• Respirators may be necessary when engineering and administrative controls do not adequately prevent exposures.
• The decision to use respiratory protection should be based on professional judgment that takes into account toxicity information, exposure measurement data, and frequency and likelihood of the worker's exposure - ensure users are not subject to high thermal loads which may result in heat stress or distress due to personal protective equipment (powered, positive flow, full face apparatus may be an option).
• Published occupational exposure limits, where they exist, will assist in determining the adequacy of the selected respiratory protection. These may be government mandated or vendor recommended.
• Certified respirators will be useful for protecting workers from inhalation of particulates when properly selected and fit tested as part of a complete respiratory protection program.
• Use approved positive flow mask if significant quantities of dust becomes airborne.
• Try to avoid creating dust conditions.

GLOVE SELECTION INDEX
• Glove selection is based on a modified presentation of the: "Forsberg Clothing Performance Index".
The effect(s) of the following substance(s) are taken into account in the computer-generated selection: sodium hydroxide
• Protective Material CPI *.
  BUTYL A
  NAT+NEOPRENNITRILE A
  NATURAL+NEOPRENE A
  NEOPRENE A
  NEOPRENE/NATURAL A
  NITRILE+PVC A
  PE A
  PE/EVAPE A
  PVC A
  SARANEX-23 A
  SARANEX-23 2-PLY A
  TEFLON A
  VITON/CHLOROBUTYL A
  NATURAL RUBBER A
  NITRILE A
• * CPI - Chemwatch Performance Index
A: Best Selection
B: Satisfactory; may degrade after 4 hours continuous immersion
C: Poor to Dangerous Choice for other than short term immersion

NOTE: As a series of factors will influence the actual performance of the glove, a final selection must be based on detailed observation.

* Where the glove is to be used on a short term, casual or infrequent basis, factors such as "feel" or convenience (e.g. disposability), may dictate a choice of gloves which might otherwise be unsuitable following long-term or frequent use. A qualified practitioner should be consulted.
### RESPIRATOR

<table>
<thead>
<tr>
<th>Protection Factor</th>
<th>Half-Face Respirator</th>
<th>Full-Face Respirator</th>
<th>Powered Air Respirator</th>
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<tbody>
<tr>
<td>10 x PEL</td>
<td>P1</td>
<td>-</td>
<td>PAPR-P1</td>
</tr>
<tr>
<td></td>
<td>Air-line*</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>50 x PEL</td>
<td>Air-line**</td>
<td>P2</td>
<td>PAPR-P2</td>
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<tr>
<td>100 x PEL</td>
<td>-</td>
<td>P3</td>
<td>-</td>
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<tr>
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<tr>
<td>100+ x PEL</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

* - Negative pressure demand  ** - Continuous flow

**Explanation of Respirator Codes:**
- Class 1 low to medium absorption capacity filters.
- Class 2 medium absorption capacity filters.
- Class 3 high absorption capacity filters.
- PAPR Powered Air Purifying Respirator (positive pressure) cartridge.
- Type A for use against certain organic gases and vapors.
- Type AX for use against low boiling point organic compounds (less than 65°C).
- Type B for use against certain inorganic gases and other acid gases and vapors.
- Type E for use against sulfur dioxide and other acid gases and vapors.
- Type K for use against ammonia and organic ammonia derivatives.
- Class P1 intended for use against mechanically generated particulates of sizes most commonly encountered in industry, e.g. asbestos, silica.
- Class P2 intended for use against both mechanically and thermally generated particulates, e.g. metal fume.
- Class P3 intended for use against all particulates containing highly toxic materials, e.g. beryllium.

The local concentration of material, quantity and conditions of use determine the type of personal protective equipment required.

Use appropriate NIOSH-certified respirator based on informed professional judgement. In conditions where no reasonable estimate of exposure can be made, assume the exposure is in a concentration IDLH and use NIOSH-certified full face pressure demand SCBA with a minimum service life of 30 minutes, or a combination full facepiece pressure demand SAR with auxiliary self-contained air supply. Respirators provided only for escape from IDLH atmospheres shall be NIOSH-certified for escape from the atmosphere in which they will be used.

### ENGINEERING CONTROLS

- **Local exhaust ventilation usually required.** If risk of overexposure exists, wear an approved respirator. Correct fit is essential to obtain adequate protection an approved self contained breathing apparatus (SCBA) may be required in some situations. Provide adequate ventilation in warehouse or closed storage area.

Air contaminants generated in the workplace possess varying "escape" velocities which, in turn, determine the "capture velocities" of fresh circulating air required to effectively remove the contaminant.

<table>
<thead>
<tr>
<th>Type of Contaminant</th>
<th>Air Speed:</th>
</tr>
</thead>
<tbody>
<tr>
<td>solvent, vapors, degreasing etc., evaporating from tank (in still air).</td>
<td>0.25-0.5 m/s (50-100 f/min.)</td>
</tr>
<tr>
<td>aerosols, fumes from pouring operations, intermittent container filling, low speed conveyor transfers, welding, spray drift, plating acid fumes, pickling (released at low velocity into zone of active generation)</td>
<td>0.5-1 m/s (100-200 f/min.)</td>
</tr>
<tr>
<td>direct spray, spray painting in shallow booths, drum filling, conveyor loading, crusher dusts, gas discharge (active generation into zone of rapid air motion)</td>
<td>1-2.5 m/s (200-500 f/min.)</td>
</tr>
<tr>
<td>grinding, abrasive blasting, tumbling, high speed wheel generated dusts (released at high initial velocity into zone of very high rapid air motion)</td>
<td>2.5-10 m/s (500-2000 f/min.)</td>
</tr>
</tbody>
</table>

Within each range the appropriate value depends on:

- Lower end of the range
- Upper end of the range
- 1: Room air currents minimal or favorable to capture
- 1: Disturbing room air currents
- 2: Contaminants of low toxicity or of nuisance value only.
- 2: Contaminants of high toxicity
- 3: Intermittent, low production.
- 3: High production, heavy use
- 4: Large hood or large air mass in motion
- 4: Small hood-local control only

Simple theory shows that air velocity falls rapidly with distance away from the opening of a simple extraction pipe. Velocity generally decreases with the square of distance from the extraction point (in simple cases). Therefore the air speed at the extraction point should be adjusted, accordingly, after reference to distance from the contaminating source. The air velocity at the extraction fan, for example, should be a minimum of 1-2 m/s (200-400 f/min) for extraction of solvents generated in a tank 2 meters distant from the extraction point. Other mechanical considerations, producing performance deficits within the extraction apparatus, make it essential that theoretical air velocities are multiplied by factors of 10 or more when extraction systems are installed or used.

### PHYSICAL AND CHEMICAL PROPERTIES

#### PHYSICAL PROPERTIES

<table>
<thead>
<tr>
<th>State</th>
<th>Divided solid</th>
<th>Molecular Weight</th>
<th>40</th>
</tr>
</thead>
<tbody>
<tr>
<td>Melting Range (°F)</td>
<td>605.12</td>
<td>Viscosity</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Boiling Range (°F)</td>
<td>2534</td>
<td>Solubility in water (g/L)</td>
<td>Miscible</td>
</tr>
</tbody>
</table>
**Non-Irritant Asthma (RADS)**

Non-atopic asthma-like symptoms may continue for months or even years after exposure to the material ceases. This may be due to a non-allergenic condition known as reactive airways dysfunction syndrome (RADS) which can occur following exposure to high levels of highly irritating compounds. Key criteria for the diagnosis of RADS include the absence of preceding respiratory disease, in a non-atopic individual, with abrupt onset of persistent asthma-like symptoms within minutes to hours of a documented exposure to the irritant. A reversible airflow pattern, on spirometry, with the presence of moderate to severe bronchial hyperreactivity on methacholine challenge testing and the lack of minimal lymphocytic inflammation, without eosinophilia, have also been included in the criteria for diagnosis of RADS. RADS (or asthma) following an irritating inhalation is an infrequent disorder with rates related to the concentration of and duration of exposure to the irritating substance.

### Section 10 - CHEMICAL STABILITY

**CONDITIONS CONTRIBUTING TO INSTABILITY**

- Presence of incompatible materials.
- Product is considered stable.
- Hazardous polymerization will not occur.

**STORAGE INCOMPATIBILITY**

- Sodium hydroxide/ potassium hydroxide:
  - reacts with water evolving heat and corrosive fumes
  - reacts violently with acids, trans-acetylene dichloride, aminotetrazole, p-bis(1,3-dibromoethyl), benzene, bromoform, halogenated compounds, nitrogen-containing compounds, organic halogens, chlorine dioxide ((explodes), chloroform, cresols, cyclopentadiene, 4-chloro-2-methylphenol, cis-dichloroethylene, 2,2-dichloro-3,3-dimethylbutane, ethylene chlorohydrin, germanium, iodine pentfluoride, maleic anhydride, p-nitrotoluene, nitroglycerin, o-nitrophenol, phosphonium iodide, potassium peroxodisulfate, propylene oxide, 1,2,4,5-tetrachlorobenzene (highly toxic substance is formene), 2,2,3,3-tetrafluoro-1-propanol, tetrahydrofuran, thorium dicarbide, trichloroethanol, 2,4,6-trinitrotoluene, vinyl acetate
  - reacts with fluorine, nitroalkanes, (forming explosive compounds)
  - incompatible with acetic acid, acetaldehyde, acetic anhydride, acrolein, acrylonitrile, allyl chloride, organic anhydride, acrylates, alcohols, aldehydes, alylene oxides, substituted allys, ammonium chloroplatinate, benzanthonre, bromine, benzen-1,4-diyl, carbon dioxide, cellulose nitrate, chlorine trifluoride, 4-chlorobutynitrilone, chloroform, chloronitrotoluenes, chlorosulfonic acid, cinnamaldehyde, caprolactam solution, chlororesols, 1,2-dichloroethylene, epichlorohydrin, ethylene cyanhydrin, formaldehyde (forms formal and flammable hydrogen gas), glycols, glyoxal, hexachloroplatinate, hydrogen sulfide, hydroquinone, iron-silicon, isocyanates, ketones, methyl azide, 4-methyl-2-nitrophenol, mineral acids (forming corresponding salt), nitrobenzene, N-nitrosohydroxylamine, nitrates pentol, phenols, phosphorus, phosphorus pentoxide, beta-propiolactone, sodium, sulfur dioxide, tetrahydroborate, 1,1,1,2-tetrachloroethane, 2,2,2-trichloroethanol, trichloroacetic acid, zinc
  - ignites on contact with cinnamaldehyde or zinc and reacts explosively with a mixture of chloroform and methane
  - forms heat-, friction-, and/or shock-sensitive explosive salts with nitro-compounds, cyanogen azide, 3-ethyl-4-hydroxy-1,2,5-oxadiazole, 3-methyl-2-penten-4-yne-1-ol, N,N'-bis(2,2,2-trinitroethyl)urea, trichloroethylene (forms dichloroacetylene)
  - increase the explosive sensitivity of nitromethane
  - attacks some plastics, rubber, coatings and metals: aluminium, tin, zinc, etc, and their alloys, producing flammable hydrogen gas
  - Metals and their oxides or salts may react violently with chlorine trifluoride. Chlorine trifluoride is a hypergolic oxidizer. It ignites on contact (without external source of heat or ignition) with recognized fuels - contact with these materials, following an ambient or slightly elevated temperature, is often violent and may produce ignition. The state of subdivision may affect the results.
  - In presence of moisture, the material is corrosive to aluminium, zinc and tin producing highly flammable hydrogen gas. Avoid strong acids.
  - Avoid contact with copper, aluminium and their alloys.

For incompatible materials - refer to Section 7 - Handling and Storage.

### Section 11 - TOXICOLOGICAL INFORMATION

**sodium hydroxide**

**TOXICITY AND IRRITATION**

- unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.

<table>
<thead>
<tr>
<th>TOXICITY</th>
<th>IRRITATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skin (rabbit): 500 mg/24h SEVERE</td>
<td></td>
</tr>
<tr>
<td>Eye (rabbit): 0.05 mg/24h SEVERE</td>
<td></td>
</tr>
<tr>
<td>Eye (rabbit): 1 mg/24h SEVERE</td>
<td></td>
</tr>
<tr>
<td>Eye (rabbit): 1 mg/30s rinsed-SEVERE</td>
<td></td>
</tr>
</tbody>
</table>

- Asthma-like symptoms may continue for months or even years after exposure to the material ceases. This may be due to a non-allergic condition known as reactive airways dysfunction syndrome (RADS) which can occur following exposure to high levels of highly irritating compound. Key criteria for the diagnosis of RADS include the absence of preceding respiratory disease, in a non-atopic individual, with abrupt onset of persistent asthma-like symptoms within minutes to hours of a documented exposure to the irritant. A reversible airflow pattern, on spirometry, with the presence of moderate to severe bronchial hyperreactivity on methacholine challenge testing and the lack of minimal lymphocytic inflammation, without eosinophilia, have also been included in the criteria for diagnosis of RADS. RADS (or asthma) following an irritating inhalation is an infrequent disorder with rates related to the concentration of and duration of exposure to the irritating substance.
Industrial bronchitis, on the other hand, is a disorder that occurs as result of exposure due to high concentrations of irritating substance (often particulate in nature) and is completely reversible after exposure ceases. The disorder is characterised by dyspnea, cough and mucus production. The material may produce severe irritation to the eye causing pronounced inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis. The material may cause severe skin irritation after prolonged or repeated exposure and may produce on contact skin redness, swelling, the production of vesicles, scaling and thickening of the skin. Repeated exposures may produce severe ulceration.

**SKIN**

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>US - California OEHHA/ARB - Acute Reference Exposure Levels and Target Organs (RELs) - Skin</th>
<th>US - California OEHHA/ARB - Chronic Reference Exposure Levels and Target Organs (CRELs) - Skin</th>
<th>US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants - Skin</th>
<th>US - Washington Permissible exposure limits of air contaminants - Skin</th>
<th>US - Hawaii Air Contaminant Limits - Skin Designation</th>
<th>US - California Permissible Exposure Limits for Chemical Contaminants - Skin</th>
</tr>
</thead>
<tbody>
<tr>
<td>sodium hydroxide</td>
<td>Skin X</td>
<td>Skin X</td>
<td>Skin Designation X</td>
<td>Skin Designation X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Section 12 - ECOLOGICAL INFORMATION**

Refer to data for ingredients, which follows:

**SODIUM HYDROXIDE:**

- Metal-containing inorganic substances generally have negligible vapour pressure and are not expected to partition to air.
- Once released to surface waters and moist soils their fate depends on solubility and dissociation in water. Environmental processes (such as oxidation and the presence of acids or bases) may transform insoluble metals to more soluble ionic forms. Microbiological processes may also transform insoluble metals to more soluble forms. Such ionic species may bind to dissolved ligands or sorb to solid particles in aquatic or aqueous media. A significant proportion of dissolved/sorbed metals will end up in sediments through the settling of suspended particles. The remaining metal ions can then be taken up by aquatic organisms.
- When released to dry soil most metals will exhibit limited mobility and remain in the upper layer; some will leach locally into ground water and/ or surface water ecosystems when soaked by rain or melt ice. Environmental processes may also be important in changing solubilities.
- Even though many metals show few toxic effects at physiological pHs, transformation may introduce new or magnified effects. A metal ion is considered infinitely persistent because it cannot degrade further.
- The current state of science does not allow for an unambiguous interpretation of various measures of bioaccumulation.
- The counter-ion may also create health and environmental concerns once isolated from the metal. Under normal physiological conditions the counter-ion may be essentially insoluble and may not be bioavailable.
- Environmental processes may enhance bioavailability.

Prevent, by any means available, spillage from entering drains or watercourses.

DO NOT discharge into sewer or waterways.

**Ecotoxicity:**

Fish LC50 (96h): 43mg/l

**Section 13 - DISPOSAL CONSIDERATIONS**

**US EPA Waste Number & Descriptions**

A. General Product Information

- Corrosivity characteristic: use EPA hazardous waste number D002 (waste code C)

**Disposal Instructions**

All waste must be handled in accordance with local, state and federal regulations.

Legislation addressing waste disposal requirements may differ by country, state and/ or territory. Each user must refer to laws operating in their area. In some areas, certain wastes must be tracked.

A Hierarchy of Controls seems to be common - the user should investigate:

- Reduction
- Reuse
- Recycling
- Disposal (if all else fails)

This material may be recycled if unused, or if it has not been contaminated so as to make it unsuitable for its intended use. Shelf life considerations should also be applied in making decisions of this type. Note that properties of a material may change in use, and recycling or reuse may not always be appropriate.

DO NOT allow wash water from cleaning equipment to enter drains. Collect all wash water for treatment before disposal.

Recycle wherever possible.

Consult manufacturer for recycling options or consult Waste Management Authority for disposal if no suitable treatment or disposal facility can be identified.

Treat and neutralize at an approved treatment plant.

Treatment should involve: Mixing or slurrying in water Neutralization followed by: Burial in a licensed land-fill or Incineration in a licensed apparatus (after admixture with suitable combustible material)

Decontaminate empty containers. Observe all label safeguards until containers are cleaned and destroyed.
**Section 14 - TRANSPORTATION INFORMATION**

<table>
<thead>
<tr>
<th>DOT:</th>
<th>Symbols:</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Hazard class or Division:</td>
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<tr>
<td>Identification Numbers:</td>
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<td></td>
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<tr>
<td></td>
<td>PG:</td>
<td>II</td>
</tr>
<tr>
<td>Label Codes:</td>
<td>8</td>
<td></td>
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<tr>
<td></td>
<td>Special provisions:</td>
<td>IB8, IP2, IP4, T3, TP33</td>
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<tr>
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<td></td>
</tr>
<tr>
<td></td>
<td>Packaging: Non-bulk:</td>
<td>212</td>
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<tr>
<td>Packaging: Exceptions:</td>
<td>154</td>
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<tr>
<td></td>
<td>Quantity limitations:</td>
<td>15 kg</td>
</tr>
<tr>
<td></td>
<td>Cargo aircraft only:</td>
<td>50 kg</td>
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<td></td>
<td>Vessel stowage: Location:</td>
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<tr>
<td>Vessel stowage: Other:</td>
<td>52</td>
<td></td>
</tr>
<tr>
<td>Hazardous materials descriptions and proper shipping names:</td>
<td>Sodium hydroxide, solid</td>
<td></td>
</tr>
</tbody>
</table>

**Air Transport IATA:**

| ICAO/IATA Class: | 8 |
| UN/ID Number: | 1823 |
| | Packing Group: | II |
| Special provisions: | None |

**Shipping Name:** SODIUM HYDROXIDE, SOLID

**Maritime Transport IMDG:**

| IMDG Class: | 8 |
| UN Number: | 1823 |
| | Packing Group: | II |
| EMS Number: | F-A,S-B |
| | Special provisions: | None |
| Limited Quantities: | 1 kg |

**Shipping Name:** SODIUM HYDROXIDE, SOLID

**Section 15 - REGULATORY INFORMATION**

*Sodium hydroxide (CAS: 1310-73-2) is found on the following regulatory lists;***


**Section 16 - OTHER INFORMATION**

LIMITED EVIDENCE
Ingestion may produce health damage*.
Cumulative effects may result following exposure*.
* (limited evidence).

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Classification of the mixture and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references. A list of reference resources used to assist the committee may be found at: www.chemwatch.net/references.

The (M)SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

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