

# SODIUM BOROHYDRIDE

GHS Safety Data Sheet

Version No:2.0

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## Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

### PRODUCT NAME

SODIUM BOROHYDRIDE

### OTHER NAMES

B-Na4-H, NaBH<sub>4</sub>, "sodium tetrahydroborate"

### PROPER SHIPPING NAME

SODIUM BOROHYDRIDE

### PRODUCT USE

Source of hydrogen and other borohydrides. Reduces aldehydes, ketones and acids. Also used in inorganic and organometallic reductions and organic syntheses.

Bleaching wool pulp, blowing agents for plastics, precipitation of mercury from waste effluent, decolourisers for plasticizers and recycling of gold and platinum group metals.

### SUPPLIER

Company: S D FINE- CHEM LIMITED

Address:

315- 317, T.V. INDUSTRIAL ESTATE,  
248, WORLI,  
MUMBAI- 400030.INDIA.

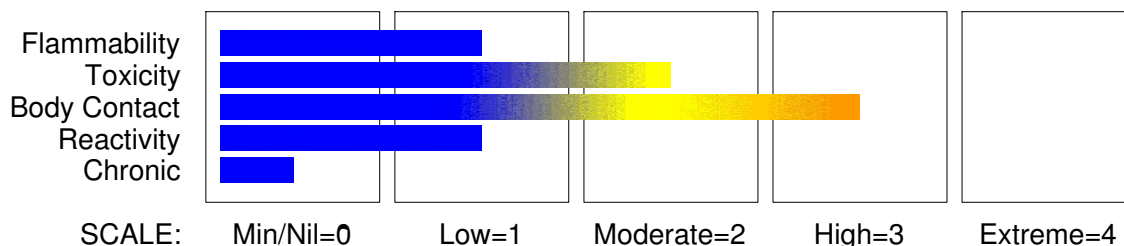
technical@sdfine.com

Telephone: 91- 22- 24959898

Telephone: 91- 22- 24959899

Fax: 91- 22- 24937232

### HAZARD RATINGS



## Section 2 - HAZARDS IDENTIFICATION

### GHS Classification

Acute Toxicity (Oral) Category 2  
Emit Flammable Gases with Water Category 1  
Skin Corrosion/Irritation Category 1C

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## Section 2 - HAZARDS IDENTIFICATION



### EMERGENCY OVERVIEW

#### HAZARD

DANGER

Determined by using GHS criteria:

H260 H300 H314

In contact with water releases flammable gases which may ignite spontaneously

Fatal if swallowed

Causes severe skin burns and eye damage

#### PRECAUTIONARY STATEMENTS

##### Prevention

Do not eat, drink or smoke when using this product.

Do not breathe dust or mist.

Wash hands thoroughly after handling.

Wear protective gloves/clothing and eye/face protection.

Wash thoroughly after handling.

Keep from any possible contact with water, because of violent reaction and possible flash fire.

Handle under inert gas, protect from moisture.

##### Response

IF INHALED: Remove to fresh air and keep at rest in a position comfortable for breathing.

Immediately call a POISON CENTER or doctor/physician.

IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.

Wash contaminated clothing before reuse.

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.

If on skin or hair: remove/take off immediately all contaminated clothing. Rinse with water/shower.

Specific treatment: refer to Label or MSDS.

##### Storage

Store locked up.

Store in a dry place and/or in a closed container

##### Disposal

Dispose of contents and container in accordance with relevant legislation.

## Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

| NAME                                                | CAS RN     | %   |
|-----------------------------------------------------|------------|-----|
| sodium borohydride                                  | 16940-66-2 | >98 |
| NOTE: Decomposes in presence of moisture to produce |            |     |
| hydrogen                                            | 1333-74-0  |     |
| sodium hydroxide                                    | 1310-73-2  |     |

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## Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

diborane

19287-45-7

## Section 4 - FIRST AID MEASURES

### SWALLOWED

For advice, contact a Poisons Information Centre or a doctor.

- IF SWALLOWED, REFER FOR MEDICAL ATTENTION, WHERE POSSIBLE, WITHOUT DELAY.

- For advice, contact a Poisons Information Centre or a doctor.

Where Medical attention is not immediately available or where the patient is more than 15 minutes from a hospital or unless instructed otherwise:

- Induce vomiting with fingers down the back of the of the throat, ONLY IF CONSCIOUS.

- Lean patient forward or place on left side (head-down position if possible) to maintain open airway and prevent aspiration.

NOTE: Wear a protective glove when inducing vomiting by mechanical means.

- In the mean time, qualified first-aid personnel should treat the patient following observation and employing supportive measures as indicated by the patient's condition.

- If the services of a medical officer or medical doctor are readily available, the patient should be placed in his/her care and a copy of the MSDS should be provided.

Further action will be the responsibility of the medical specialist.

- If medical attention is not available on the worksite or surroundings send the patient to a hospital together with a copy of the MSDS.

### 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 Centre 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 Centre.

- Transport to hospital, or doctor.

### INHALED

- If fumes or combustion products are inhaled remove from contaminated area.

- Lay patient down. Keep warm and rested.

- Prosthesis 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.

### NOTES TO PHYSICIAN

For acute or repeated short term exposures to boron and its compounds:

- Nausea, vomiting, diarrhoea and epigastric pain, haematemesis and blue-green discolouration of both faeces and vomitus characterise adult boron intoxication.

- Access and correct any abnormalities found in airway and circulation.

- A tidal volume of 10-15 mg/kg should be maintained.

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## Section 4 - FIRST AID MEASURES

- Emesis should be induced unless the patient is in coma, is experiencing seizures or has lost the gag reflex. If any of these are present, gastric lavage should be performed with a large-bore tube after endotracheal intubation or in the presence of continuous respiratory action.
- Activated charcoal is probably not of value though its use might be indicated following gastric evacuation. Catharsis might be useful to eliminate any borates remaining in the gastro-intestinal tract (magnesium sulfate: adults, 30 gms: children 250 mg/kg).
- Peritoneal dialysis and haemodialysis remove some borates.  
[Ellenhorn and Barceloux: Medical Toxicology].

## Section 5 - FIRE FIGHTING MEASURES

### FIRE FIGHTING

Alert Fire Brigade 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 courses.

Use fire fighting procedures suitable for surrounding area.

DO NOT approach containers suspected to be hot.

If safe to do so, remove containers from path of fire.

Equipment should be thoroughly decontaminated after use.

### FIRE/EXPLOSION HAZARD

- Solid which exhibits difficult combustion or is difficult to ignite.
- Avoid generating dust, particularly clouds of dust in a confined or unventilated space as dusts may form an explosive mixture with air, and any source of ignition, i.e. flame or spark, will cause fire or explosion. Dust clouds generated by the fine grinding of the solid are a particular hazard; accumulations of fine dust may burn rapidly and fiercely if ignited.
- Dry dust can also be charged electrostatically by turbulence, pneumatic transport, pouring, in exhaust ducts and during transport.
- Build-up of electrostatic charge may be prevented by bonding and grounding.
- Powder handling equipment such as dust collectors, dryers and mills may require additional protection measures such as explosion venting.
- All movable parts coming in contact with this material should have a speed of less than 1-metre/sec.

### Personal Protective Equipment

Gas tight chemical resistant suit.

## Section 6 - ACCIDENTAL RELEASE MEASURES

### EMERGENCY PROCEDURES

#### MINOR SPILLS

Clean up all spills immediately.

Avoid breathing vapours and contact with skin and eyes.

Wear protective clothing, gloves, safety glasses and dust respirator.

Remove all ignition sources.

Use dry clean up procedures and avoid generating dust.

Place in suitable containers for disposal.

- Material from spill may be contaminated with water resulting in generation of highly flammable hydrogen gas with pressurising of closed containers.
- Hold spill material in vented containers only and plan for prompt disposal.

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## Section 6 - ACCIDENTAL RELEASE MEASURES

### MAJOR SPILLS

Clear area of personnel and move upwind.

Alert Fire Brigade 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 courses.

Shut off all possible sources of ignition and increase ventilation.

Stop leak if safe to do so.

Avoid generating dust.

Contain spill with sand, earth or vermiculite.

Collect recoverable product into labelled containers for recycling.

DO NOT use water.

Use dry clean up procedures and avoid generating dust.

Collect residues and seal in labelled drums for disposal.

Use a solvent to clean the area.

If contamination of drains or waterways occurs, advise emergency services.

After clean up operations, decontaminate and launder all protective clothing and equipment before storing and re-using.

### 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 borohydride 7.5 mg/m<sup>3</sup>

irreversible or other serious effects or symptoms which could impair an individual's ability to take protective action is:

sodium borohydride 1.5 mg/m<sup>3</sup>

other than mild, transient adverse effects without perceiving a clearly defined odour is:

sodium borohydride 0.2 mg/m<sup>3</sup>

The threshold concentration below which most people will experience no appreciable risk of health effects:

sodium borohydride 0.075 mg/m<sup>3</sup>

American Industrial Hygiene Association (AIHA)

Ingredients considered according to the following cutoffs

|                 |          |               |         |
|-----------------|----------|---------------|---------|
| Very Toxic (T+) | >= 0.1%  | Toxic (T)     | >= 3.0% |
| R50             | >= 0.25% | Corrosive (C) | >= 5.0% |
| R51             | >= 2.5%  |               |         |
| else            | >= 10%   |               |         |

where percentage is percentage of ingredient found in the mixture

**Personal Protective Equipment advice is contained in Section 8 of the MSDS.**

## Section 7 - HANDLING AND STORAGE

### PROCEDURE FOR HANDLING

Use good occupational work practice.

Avoid generating and breathing dust.

Avoid contact with skin and eyes.

Wear personal protective equipment when handling.

When handling, DO NOT eat, drink or smoke.

Use in a well-ventilated area.

Avoid all ignition sources.

Avoid contact with incompatible materials.

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## Section 7 - HANDLING AND STORAGE

Never add water to this product.  
Keep containers securely sealed when not in use.  
Handle and open container with care.  
Always wash hands with soap and water after handling. Work clothes should be laundered separately.

### SUITABLE CONTAINER

Plastic container.  
Plastic drum.  
Polyethylene or polypropylene container.  
Polylined drum.  
• Check that containers are clearly labelled.  
Packaging as recommended by manufacturer.

### STORAGE INCOMPATIBILITY

Contact with acids produces toxic fumes.  
Avoid strong oxidising agents, strong acids, water and alcohol.  
Mixing of solid sodium borohydride with charcoal in air promotes oxidation to produce a self-heating reaction that may result in the ignition of charcoal and in the production of hydrogen through thermal decomposition of sodium borohydride. Sodium borohydride in dimethylformamide (DMF) will undergo runaway thermal reactions resulting in violent decompositions. An induction period is normally involved and is temperature dependent (45 hours at 62 deg C and 45 minutes at 90 deg C.) The temperature may reach trimethylamine (a reaction byproduct) autoignition temperature (190 deg C). The addition of supported noble metal catalysts to solutions containing sodium borohydride can result in ignition of limited hydrogen gas. Reduction of ruthenium salt solutions with borohydride solutions, to give a metal or alloy, may also produce other solid products which when dried, may explode when disturbed by spatula (for example).

### STORAGE REQUIREMENTS

- Keep dry.
- Store in original containers.
- Keep containers securely sealed.
- No smoking, naked lights or ignition sources.
- Store in a cool, dry, well-ventilated area.
- Store away from incompatible materials.
- Protect containers against physical damage.
- Check regularly for leaks.
- Observe manufacturer's storing and handling recommendations.

### SAFE STORAGE WITH OTHER CLASSIFIED CHEMICALS



+: May be stored together

O: May be stored together with specific preventions

X: Must not be stored together

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## Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

### EXPOSURE CONTROLS

The following materials had no OELs on our records

- sodium borohydride: CAS:16940- 66- 2
- hydrogen: CAS:1333- 74- 0
- sodium hydroxide: CAS:1310- 73- 2
- diborane: CAS:19287- 45- 7

### EMERGENCY EXPOSURE LIMITS

| Material         | Revised IDLH Value (mg/m3) | Revised IDLH Value (ppm) |
|------------------|----------------------------|--------------------------|
| sodium hydroxide | 10                         |                          |
| diborane         |                            | 15                       |

### ODOUR SAFETY FACTOR (OSF)

OSF=0.04 (DIBORANE)

Exposed individuals are NOT reasonably expected to be warned, by smell, that the Exposure Standard is being exceeded.

Odour Safety Factor (OSF) is determined to fall into either Class C, D or E.

The Odour Safety Factor (OSF) is defined as:

OSF= Exposure Standard (TWA) ppm/ Odour Threshold Value (OTV) ppm

Classification into classes follows:

| Class | OSF     | Description                                                                                                                                                       |
|-------|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A     | 550     | Over 90% of exposed individuals are aware by smell that the Exposure Standard (TLV- TWA for example) is being reached, even when distracted by working activities |
| B     | 26- 550 | As " A" for 50- 90% of persons being distracted                                                                                                                   |
| C     | 1- 26   | As " A" for less than 50% of persons being distracted                                                                                                             |
| D     | 0.18- 1 | 10- 50% of persons aware of being tested perceive by smell that the Exposure Standard is being reached                                                            |
| E     | <0.18   | As " D" for less than 10% of persons aware of being tested                                                                                                        |

### MATERIAL DATA

These "dusts" have little adverse effect on the lungs and do not produce toxic effects or organic disease. Although there is no dust which does not evoke some cellular response at sufficiently high concentrations, the cellular response caused by P.N.O.C.s has the following characteristics:

- the architecture of the air spaces remain intact,
- scar tissue (collagen) is not synthesised to any degree,
- tissue reaction is potentially reversible.

Extensive concentrations of P.N.O.C.s may:

- seriously reduce visibility,
- cause unpleasant deposits in the eyes, ears and nasal passages,
- contribute to skin or mucous membrane injury by chemical or mechanical action, per se,

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# SODIUM BOROHYDRIDE

## Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

or by the rigorous skin cleansing procedures necessary for their removal. [ACGIH]

This limit does not apply:

- to brief exposures to higher concentrations
- nor does it apply to those substances that may cause physiological impairment at lower concentrations but for which a TLV has as yet to be determined.

This exposure standard applies to particles which

- are insoluble or poorly soluble\* in water or, preferably, in aqueous lung fluid (if data is available) and
- have a low toxicity (i.e.. are not cytotoxic, genotoxic, or otherwise chemically reactive with lung tissue, and do not emit ionizing radiation, cause immune sensitization, or cause toxic effects other than by inflammation or by a mechanism of lung overload).

### INGREDIENT DATA

HYDROGEN:

ES TWA: simple asphyxiant

TLV TWA: simple asphyxiant

Simple asphyxiants are gases which, when present in high concentrations, reduce the oxygen content in air below that required to support breathing, consciousness and life; loss of consciousness, with death by suffocation may rapidly occur in an oxygen deficient atmosphere.

CARE: Most simple asphyxiants are odourless and there is no warning on entry into an oxygen deficient atmosphere. If there is any doubt, oxygen content can be checked simply and quickly. It may not be appropriate to only recommend an exposure standard for simple asphyxiants rather it is essential that sufficient oxygen be maintained. Air normally has 21 percent oxygen by volume, with 18 percent regarded as minimum under normal atmospheric pressure to maintain consciousness / life. At pressures significantly higher or lower than normal atmospheric pressure, expert guidance should be sought.

SODIUM HYDROXIDE:

The TLV-C is recommended based on concentrations that produce noticeable but not excessive, ocular and upper respiratory tract irritation.

DIBORANE:

Odour Threshold Value: 1.8-3.5 ppm

While the primary toxic effect of diborane involves the lungs, neurological effects may also occur. The recommended TLV-TWA is thought to prevent risk of acute poisoning of the lung and cumulative effects on the nervous system.

### PERSONAL PROTECTION



#### EYE

- Safety glasses with side shields.
- Chemical goggles.

DO NOT wear contact lenses.

· Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lens or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation - lens should be

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## Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59].

### HANDS/FEET

Rubber gloves.  
PVC gloves.  
Impervious gloves.  
Safety footwear.  
Rubber boots.

### OTHER

Overalls.  
· Impervious protective clothing.  
· Barrier cream.  
· Eyewash unit.  
Ensure there is ready access to a safety shower.

### RESPIRATOR

| Protection Factor | Half- Face Respirator | Full- Face Respirator | Powered Air Respirator |
|-------------------|-----------------------|-----------------------|------------------------|
| 10 x ES           | P1 Air- line*         | - -                   | PAPR- P1 -             |
| 50 x ES           | Air- line**           | P2                    | PAPR- P2               |
| 100 x ES          | -                     | P3                    | -                      |
|                   |                       | Air- line*            | -                      |
| 100+ x ES         | -                     | Air- line**           | PAPR- P3               |

\* - Negative pressure demand \*\* - Continuous flow.

The local concentration of material, quantity and conditions of use determine the type of personal protective equipment required.  
For further information consult your Occupational Health and Safety Advisor.

### ENGINEERING CONTROLS

General exhaust is adequate under normal operating conditions. Local exhaust ventilation may be required in specific circumstances. If risk of overexposure exists, wear approved respirator. Correct fit is essential to obtain adequate protection. Provide adequate ventilation in warehouse or closed storage areas. 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.

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

Within each range the appropriate value depends on:

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## Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

Lower end of the range

- 1: Room air currents minimal or favourable to capture
- 2: Contaminants of low toxicity or of nuisance value only.
- 3: Intermittent, low production.
- 4: Large hood or large air mass in motion

Upper end of the range

- 1: Disturbing room air currents
- 2: Contaminants of high toxicity
- 3: High production, heavy use
- 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.

## Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

### APPEARANCE

White crystalline, odourless, powder; mixes with water, ammonia, amines, pyridine and dimethyl ether of diethylene glycol; immiscible with other ethers, hydrocarbons and alkyl chlorides. Hygroscopic; stable in dry air to 300 deg C., decomposes slowly in moist air or in vacuum at 400 deg C. Reacts with water to evolve hydrogen and sodium hydroxide. Heat decomposes it to release hydrogen gas. May react slowly or rapidly with acids or certain transition metal catalysts to liberate hydrogen.

### PHYSICAL PROPERTIES

Solid.

Contact with acids liberates toxic gas.

Molecular Weight: 37.8

Melting Range (°C): 36- 37

Solubility in water (g/L): Reacts

pH (1% solution): > 7

Volatile Component (%vol): Not available.

Relative Vapour Density (air=1): 1.3

Lower Explosive Limit (%): Not available.

Autoignition Temp (°C): Not available.

State: Divided solid

Boiling Range (°C): 500 (decomposes)

Specific Gravity (water=1): 1.07

pH (as supplied): Not applicable

Vapour Pressure (kPa): Not available.

Evaporation Rate: Not available

Flash Point (°C): Not available.

Upper Explosive Limit (%): Not available.

Decomposition Temp (°C): Not available

## Section 10 - CHEMICAL STABILITY AND REACTIVITY INFORMATION

### CONDITIONS CONTRIBUTING TO INSTABILITY

Contact with acids liberates toxic gases.

Presence of water.

Presence of incompatible materials.

Stable under normal storage conditions.

Product is considered stable under normal handling conditions.

Hazardous polymerisation will not occur.

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## Section 11 - TOXICOLOGICAL INFORMATION

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### POTENTIAL HEALTH EFFECTS

#### ACUTE HEALTH EFFECTS

##### SWALLOWED

The material can produce chemical burns within the oral cavity and gastrointestinal tract following ingestion.

Considered an unlikely route of entry in commercial/industrial environments.

Ingestion of alkaline corrosives may produce immediate pain, and circumoral burns. Mucous membrane corrosive damage is characterised by a white appearance and soapy feel; this may then become brown, oedematous and ulcerated. Profuse salivation with an inability to swallow or speak may also result. Even where there is limited or no evidence of chemical burns, both the oesophagus and stomach may experience a burning pain; vomiting and diarrhoea may follow. The vomitus may be thick and may be slimy (mucous) and may eventually contain blood and shreds of mucosa. Epiglottal oedema may result in respiratory distress and asphyxia. Marked hypotension is symptomatic of shock; a weak and rapid pulse, shallow respiration and clammy skin may also be evident. Circulatory collapse may occur and, if uncorrected, may produce renal failure. Severe exposures may result in oesophageal or gastric perforation accompanied by mediastinitis, substernal pain, peritonitis, abdominal rigidity and fever. Although oesophageal, gastric or pyloric stricture may be evident initially, these may occur after weeks or even months and years. Death may be quick and results from asphyxia, circulatory collapse or aspiration of even minute amounts. Death may also be delayed as a result of perforation, pneumonia or the effects of stricture formation.

##### EYE

The material can produce chemical burns to the eye following direct contact. Vapours or mists may be extremely irritating.

When applied to the eye(s) of animals, the material produces severe ocular lesions which are present twenty-four hours or more after instillation.

##### SKIN

Skin contact with the material may damage the health of the individual; systemic effects may result following absorption.

The material can produce chemical burns following direct contact with the skin.

Solution of material in moisture on the skin, or perspiration, may markedly increase skin corrosion and accelerate tissue destruction.

Open cuts, abraded or irritated skin should not be exposed to this material.

Toxic effects may result from skin absorption.

##### INHALED

Evidence shows, or practical experience predicts, that the material produces irritation of the respiratory system in a substantial number of individuals following inhalation.

#### CHRONIC HEALTH EFFECTS

Principal routes of exposure are by accidental skin and eye contact and inhalation of generated dusts.

Chronic effects of diborane exposure include respiratory distress.

Prolonged exposure to low concentrations causes headache, vertigo, chills and, sometimes, fever. Daily 6 hour exposures at 7 ppm proved fatal in dogs (10-25 exposures) and rats (7-113 exposures). Although pulmonary changes could not be substantiated, the repeated respiratory insult was thought to be the underlying cause of death. Dogs developed signs of respiratory infection probably secondary to respiratory irritation.

As with any chemical product, contact with unprotected bare skin; inhalation of vapour,

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## Section 11 - TOXICOLOGICAL INFORMATION

mist or dust in work place atmosphere; or ingestion in any form, should be avoided by observing good occupational work practice.

### TOXICITY AND IRRITATION

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

#### TOXICITY

Oral (rat) LDLo: 160 mg/kg

#### IRRITATION

Nil Reported

#### HYDROGEN:

No significant acute toxicological data identified in literature search.

#### SODIUM HYDROXIDE:

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

#### TOXICITY

#### IRRITATION

Skin (rabbit): 500 mg/24h SEVERE

Eye (rabbit): 0.05 mg/24h SEVERE

Eye (rabbit):1 mg/24h SEVERE

Eye (rabbit):1 mg/30s rinsed- SEVERE

The material may produce severe irritation to the eye causing pronounced inflammation.

Repeated or prolonged exposure to irritants may produce conjunctivitis.

The material may produce severe skin irritation after prolonged or repeated exposure, and may produce a contact dermatitis (nonallergic). This form of dermatitis is often characterised by skin redness (erythema) thickening of the epidermis.

Histologically there may be intercellular oedema of the spongy layer (spongiosis) and intracellular oedema of the epidermis. Prolonged contact is unlikely, given the severity of response, but repeated exposures may produce severe ulceration.

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 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.

#### DIBORANE:

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

#### TOXICITY

Inhalation (rat) LC50: 40 ppm/4h

#### IRRITATION

Nil Reported

## Section 12 - ECOLOGICAL INFORMATION

No data for sodium borohydride.

Refer to data for ingredients, which follows:

#### HYDROGEN:

ThOD: 3.73

#### SODIUM HYDROXIDE:

Prevent, by any means available, spillage from entering drains or water

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## Section 12 - ECOLOGICAL INFORMATION

courses.  
DO NOT discharge into sewer or waterways.  
Ecotoxicity:  
Fish LC50 (96h): 43mg/l

## Section 13 - DISPOSAL CONSIDERATIONS

Recycle wherever possible.  
Consult manufacturer for recycling options.  
Consult State Land Waste Management Authority for disposal.  
Bury residue in an authorised landfill.  
Recycle containers if possible, or dispose of in an authorised landfill.  
Dissolve in large volume of water. Carefully add a dilute solution of acetic acid or acetone. Provision should be made to safely vent hydrogen gas given off during reaction. Adjust pH of solution to 1 if necessary.  
Stand overnight and filter.

## Section 14 - TRANSPORTATION INFORMATION



Labels Required: DANGEROUS WHEN WET  
HAZCHEM: 4X

### UNDG:

|                                   |      |                |      |
|-----------------------------------|------|----------------|------|
| Dangerous Goods Class:            | 4.3  | Subrisk:       | None |
| UN Number:                        | 1426 | Packing Group: | I    |
| Shipping Name: SODIUM BOROHYDRIDE |      |                |      |

### Air Transport IATA:

|                                   |           |                     |           |
|-----------------------------------|-----------|---------------------|-----------|
| ICAO/IATA Class:                  | 4.3       | ICAO/IATA Subrisk:  | None      |
| UN/ID Number:                     | 1426      | Packing Group:      | I         |
| Special provisions:               | None      |                     |           |
| Cargo Only                        |           |                     |           |
| Packing Instructions:             | 412       | Maximum Qty/Pack:   | 15 kg     |
| Passenger and Cargo               |           | Passenger and Cargo |           |
| Packing Instructions:             | Forbidden | Maximum Qty/Pack:   | Forbidden |
| Passenger and Cargo               |           | Passenger and Cargo |           |
| Limited Quantity                  |           | Limited Quantity    |           |
| Packing Instructions:             | -         | Maximum Qty/Pack:   | -         |
| Shipping Name: SODIUM BOROHYDRIDE |           |                     |           |

### Maritime Transport IMDG:

|                                   |            |                     |      |
|-----------------------------------|------------|---------------------|------|
| IMDG Class:                       | 4.3        | IMDG Subrisk:       | None |
| UN Number:                        | 1426       | Packing Group:      | I    |
| EMS Number:                       | F- G, S- O | Special provisions: | None |
| Shipping Name: SODIUM BOROHYDRIDE |            |                     |      |

continued...

# SODIUM BOROHYDRIDE

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## Section 15 - REGULATORY INFORMATION

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### REGULATIONS

sodium borohydride (CAS: 16940-66-2) is found on the following regulatory lists:  
IMO MARPOL 73/78 (Annex II) - List of Noxious Liquid Substances Carried in Bulk  
OECD Representative List of High Production Volume (HPV) Chemicals

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## Section 16 - OTHER INFORMATION

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The above information is believed to be accurate and represent the best information currently available to us, but does not represent any warranty expressed or implied of the properties of the product. User should make their own investigation to determine the suitability of the information for their particular purpose.

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