



Sodium triacetoxyborohydride

Apollo Scientific

Chemwatch Hazard Alert Code: 3

Part Number: OR2863

Version No: 2.2

Safety Data Sheet

Issue Date: 06/07/2023

Print Date: 06/07/2023

S.GHS.GB-NIR.EN

SECTION 1 Identification of the substance / mixture and of the company / undertaking

Product Identifier

| | |
|-------------------------------|---|
| Product name | Sodium triacetoxyborohydride |
| Chemical Name | sodium triacetoxyborohydride |
| Synonyms | Not Available |
| Proper shipping name | METAL HYDRIDES, WATER- REACTIVE, N.O.S. |
| Chemical formula | C6H10BO6.Na |
| Other means of identification | Not Available |
| CAS number | 56553-60-7* |

Relevant identified uses of the substance or mixture and uses advised against

| | |
|--------------------------|---------------|
| Relevant identified uses | Not Available |
|--------------------------|---------------|

Details of the manufacturer or supplier of the safety data sheet

| | | |
|-------------------------|---|--|
| Registered company name | Apollo Scientific | Apollo Scientific Ltd |
| Address | Whitefield Road, Bredbury SK62QR United Kingdom | Whitefield Road, Bredbury Cheshire SK6 2QR United Kingdom (NI) |
| Telephone | 01614060505 | +44(0) 161 406 0505 |
| Fax | 0161 406 0506 | Not Available |
| Website | http://www.apolloscientific.co.uk/ | apolloscientific.co.uk |
| Email | sales@apolloscientific.co.uk | sales@apolloscientific.co.uk |

Emergency telephone number

| | |
|-----------------------------------|---------------|
| Association / Organisation | Not Available |
| Emergency telephone numbers | Not Available |
| Other emergency telephone numbers | Not Available |

SECTION 2 Hazards identification


Classification of the substance or mixture

| | |
|--|---|
| Classification according to regulation (EC) No 1272/2008 [CLP] and | H314 - Skin Corrosion/Irritation Category 1B, H318 - Serious Eye Damage/Eye Irritation Category 1, H228 - Flammable Solids Category 2, H261 - Substances and Mixtures which in Contact with Water Emit Flammable Gases Category 2 |
|--|---|

Sodium triacetoxyborohydride

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| amendments ^[1] | |
| Legend: | 1. Classified by Chemwatch; 2. Classification drawn from Regulation (EU) No 1272/2008 - Annex VI |

Label elements

| | |
|----------------------------|---|
| Hazard pictogram(s) |  |
| Signal word | Danger |

Hazard statement(s)

| | |
|-------------|---|
| H314 | Causes severe skin burns and eye damage. |
| H228 | Flammable solid. |
| H261 | In contact with water releases flammable gases. |

Precautionary statement(s) Prevention

| | |
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| P210 | Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. |
| P231+P232 | Handle and store contents under inert gas. Protect from moisture. |
| P260 | Do not breathe dust/fume. |
| P264 | Wash all exposed external body areas thoroughly after handling. |
| P280 | Wear protective gloves, protective clothing, eye protection and face protection. |
| P240 | Ground and bond container and receiving equipment. |
| P241 | Use explosion-proof electrical/ventilating/lighting/intrinsically safe equipment. |
| P223 | Do not allow contact with water. |

Precautionary statement(s) Response

| | |
|-----------------------|--|
| P301+P330+P331 | IF SWALLOWED: Rinse mouth. Do NOT induce vomiting. |
| P302+P335+P334 | IF ON SKIN: Brush off loose particles from skin. Immerse in cool water [or wrap in wet bandages]. |
| P303+P361+P353 | IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water [or shower]. |
| P305+P351+P338 | IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. |
| P310 | Immediately call a POISON CENTER/doctor/physician/first aider. |
| P370+P378 | In case of fire: Use alcohol resistant foam or normal protein foam to extinguish. |
| P363 | Wash contaminated clothing before reuse. |
| P304+P340 | IF INHALED: Remove person to fresh air and keep comfortable for breathing. |

Precautionary statement(s) Storage

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|------------------|--|
| P405 | Store locked up. |
| P402+P404 | Store in a dry place. Store in a closed container. |

Precautionary statement(s) Disposal

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| P501 | Dispose of contents/container to authorised hazardous or special waste collection point in accordance with any local regulation. |
|-------------|--|

SECTION 3 Composition / information on ingredients

Substances

| CAS No | %[weight] | Name | Classification according to regulation (EC) No 1272/2008 [CLP] and amendments | SCL / M-Factor |
|-------------|-----------|-------------------------------------|--|----------------|
| 56553-60-7* | 100 | <u>Sodium triacetoxyborohydride</u> | Skin Corrosion/Irritation Category 1B, Serious Eye Damage/Eye Irritation Category 1, Flammable Solids Category 2, Substances and Mixtures which in Contact with Water Emit Flammable Gases Category 2; H314, H228, H261 ^[1] | Not Available |

Legend: 1. Classified by Chemwatch; 2. Classification drawn from Regulation (EU) No 1272/2008 - Annex VI; 3. Classification drawn from C&L; * EU IOELVs available; [e] Substance identified as having endocrine disrupting properties

Sodium triacetoxymethylborohydride

Mixtures

See section above for composition of Substances

SECTION 4 First aid measures**Description of first aid measures**

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| Eye Contact | <p>If this product comes in contact with the eyes:</p> <ul style="list-style-type: none"> ▶ 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 Contact | <p>If skin or hair contact occurs:</p> <ul style="list-style-type: none"> ▶ 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. |
| Inhalation | <ul style="list-style-type: none"> ▶ 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. |
| Ingestion | <ul style="list-style-type: none"> ▶ For advice, contact a Poisons Information Centre 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 casualty can comfortably drink. ▶ Transport to hospital or doctor without delay. |

Indication of any immediate medical attention and special treatment needed

Treat symptomatically.

SECTION 5 Firefighting measures**Extinguishing media**

- ▶ Use dry chemical, including special formulations of dry chemicals
- ▶ Powdered limestone, dolomite, powdered graphite or powdered salt.
- ▶ **DO NOT** use water, CO₂ or foam.

Special hazards arising from the substrate or mixture

| | |
|-----------------------------|-------------|
| Fire Incompatibility | None known. |
|-----------------------------|-------------|

Advice for firefighters

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| Fire Fighting | <ul style="list-style-type: none"> ▶ Alert Fire Brigade and tell them location and nature of hazard. ▶ Wear breathing apparatus plus protective gloves. ▶ Prevent, by any means available, spillage from entering drains or water course. ▶ Fight fire from a safe distance, with adequate cover. ▶ If safe, switch off electrical equipment until vapour fire hazard removed. ▶ Use water delivered as a fine spray to control fire and cool adjacent area. ▶ Avoid spraying water onto liquid pools. ▶ 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. |
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| Fire/Explosion Hazard | <ul style="list-style-type: none"> ▶ Metal powders, while generally regarded as non-combustible, may burn when metal is finely divided and energy input is high. ▶ DO NOT use water or foam as generation of explosive hydrogen may result. ▶ May be ignited by friction, heat, sparks or flame. ▶ Metal dust fires are slow moving but intense and difficult to extinguish. ▶ Will burn with intense heat. ▶ DO NOT disturb burning dust. Explosion may result if dust is stirred into a cloud, by providing oxygen to a large surface of hot metal. ▶ Containers may explode on heating. ▶ Dusts or fumes may form explosive mixtures with air. ▶ May REIGNITE after fire is extinguished. ▶ Gases generated in fire may be poisonous, corrosive or irritating. |
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SECTION 6 Accidental release measures

Personal precautions, protective equipment and emergency procedures

See section 8

Environmental precautions

See section 12

Methods and material for containment and cleaning up

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| Minor Spills | <ul style="list-style-type: none"> ▶ Remove all ignition sources. ▶ DO NOT touch or walk through spilled material. ▶ Clean up all spills immediately. ▶ Avoid contact with skin and eyes. ▶ Prevent dust cloud. ▶ With clean shovel (preferably non-sparking) place material into clean, dry container and cover loosely. ▶ Move containers from spill area. ▶ Control personal contact with the substance, by using protective equipment. |
| Major Spills | <ul style="list-style-type: none"> ▶ Clear area of personnel and move upwind. ▶ Alert Fire Brigade and tell them location and nature of hazard. ▶ DO NOT touch or walk through spilled material. ▶ Control personal contact with the substance, by using protective equipment. ▶ Prevent, by any means available, spillage from entering drains or water course. ▶ No smoking, naked lights or ignition sources. ▶ Increase ventilation. ▶ Stop leak if safe to do so. ▶ Contain or cover with sand, earth or vermiculite. ▶ Use only spark-free shovels and explosion proof equipment. ▶ Collect recoverable product into labelled containers for recycling. ▶ Collect solid residues and seal in labelled drums for disposal. ▶ Wash area with water and dike for later disposal; 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. |

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

SECTION 7 Handling and storage

Precautions for safe handling

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|----------------------|--|
| Safe handling | <ul style="list-style-type: none"> ▶ Avoid all personal contact, including inhalation. ▶ Wear protective clothing when risk of overexposure occurs. ▶ Use in a well-ventilated area. ▶ Prevent concentration in hollows and sumps. ▶ DO NOT enter confined spaces until atmosphere has been checked. ▶ DO NOT allow material to contact humans, exposed food or food utensils. ▶ Avoid smoking, naked lights or ignition sources. ▶ When handling, DO NOT eat, drink or smoke. ▶ Avoid contact with incompatible materials. ▶ Keep containers securely sealed when not in use. ▶ Avoid physical damage to containers. ▶ Always wash hands with soap and water after handling. ▶ Working clothes should be laundered separately. Launder contaminated clothing before re-use. ▶ Use good occupational work practice. ▶ Observe manufacturer's storage and handling recommendations contained within this SDS. |
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| | <ul style="list-style-type: none"> ▶ Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained. |
| Other information | <p>FOR MINOR QUANTITIES:</p> <ul style="list-style-type: none"> ▶ Store in an indoor fireproof cabinet or in a room of noncombustible construction. ▶ Provide adequate portable fire-extinguishers in or near the storage area. <p>FOR PACKAGE STORAGE:</p> <ul style="list-style-type: none"> ▶ Store in original containers in approved flame-proof area. ▶ No smoking, naked lights, heat or ignition sources. ▶ DO NOT store in pits, depressions, basements or areas where vapours may be trapped. ▶ Keep containers securely sealed. ▶ Store away from incompatible materials in a cool, dry, well ventilated area. ▶ Protect containers against physical damage and check regularly for leaks. ▶ Protect containers from exposure to weather and from direct sunlight unless: (a) the packages are of metal or plastic construction; (b) the packages are securely closed and not opened for any purpose while in the area where they are stored and (c) adequate precautions are taken to ensure that rain water, which might become contaminated by the dangerous goods, is collected and disposed of safely. ▶ Ensure proper stock-control measures are maintained to prevent prolonged storage of dangerous goods. ▶ Observe manufacturer's storage and handling recommendations contained within this SDS. |

Conditions for safe storage, including any incompatibilities

| | |
|-------------------------|--|
| Suitable container | <p>For low viscosity materials and solids: 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.</p> <p>For materials with a viscosity of at least 2680 cSt. (23 deg. C):</p> <ul style="list-style-type: none"> ▶ Removable head packaging and ▶ cans with friction closures may be used. <p>-</p> <p>Where combination packages are used, there must be sufficient inert absorbent material to absorb completely any leakage that may occur, unless the outer packaging is a close fitting moulded plastic box and the substances are not incompatible with the plastic.</p> <p>All combination packages for Packing group I and II must contain cushioning material.</p> <ul style="list-style-type: none"> ▶ Heavy gauge metal packages / Heavy gauge metal drums |
| Storage incompatibility | <ul style="list-style-type: none"> - Many metals will form metal hydrides. The key to practical use of metal hydrides is their ability to both absorb and release the same quantity of hydrogen many times without deterioration. The reaction is reversible and is determined by the pressure of the hydrogen gas. If the pressure is above a certain level (the equilibrium pressure), the reaction proceeds to form a metal hydride; if below the equilibrium pressure, hydrogen is liberated and the metal returns to its original state. The equilibrium pressure, itself, depends upon temperature; it increases with increasing temperature and vice versa. - Hydride alloys can be engineered to operate at different temperatures and pressures by modifying alloy composition and production techniques. - Metal hydrides begin as intermetallic compounds produced in much the same way as any other metal alloy. They exhibit one important difference. When exposed to hydrogen at certain pressures and temperatures, they absorb large quantities of the gas and form metal hydride compounds. When this happens, hydrogen is distributed compactly throughout the metal lattice. Metal hydrides represent a method for storing hydrogen. They are inherently safer than compressed gas or liquid hydrogen and have a higher volumetric hydrogen storage capacity. Some hydrides can actually store twice the amount of hydrogen than can be stored in the same volume of liquid hydrogen. - Metal hydride formation is also accompanied by hysteresis, which appears as the difference between the absorption curve and the desorption curve. - Metal hydrides react with water to produce a base and hydrogen gas. Because the reaction of metal hydrides with water is less vigorous than that of bare metals, metal hydrides are sometimes seen being used as desiccants (drying agents). - Metal hydrides are characterised by nucleophilic, electrophilic, and radical behavior. The exact behavior of a given metal hydride complex depends on its electronic properties, its M-H bond dissociation energy, and the nature of the reacting partner. Basic metal hydrides react with acids to free up a coordination site on the metal centre - Migratory insertion reactions involving M-H bonds are extremely important in a practical sense (for example hydrogenation and hydroformylation), and are conceptually related to nucleophilic hydride transfers from the metal centre. - The behavior of hydrides is controlled by the nature of the metal centre and its accompanying ligands. However, it is interesting to note that the observed behavior of hydrides often depends on the nature of the reaction conditions, as well. Some complexes display "schizophrenic" behavior, putting on their nucleophile hat in the presence of an electrophile and their electrophile hat in the presence of a nucleophile. - Interstitial hydrides or metallic hydrides - Interstitial hydrides most commonly exist within metals or alloys. They are traditionally termed 'compounds', even though they do not strictly conform to the definition of a compound; more closely resembling common alloys such as steel. In such hydrides, hydrogen can exist as either atomic, or diatomic entities. Mechanical or thermal processing, such as bending, striking, or annealing may cause the hydrogen to precipitate out of solution, by degassing. Their bonding is generally considered metallic. - Such bulk transition metals form interstitial binary hydrides when exposed to hydrogen. These systems are usually non-stoichiometric, with variable amounts of hydrogen atoms in the lattice. In materials engineering, the |

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phenomenon of hydrogen embrittlement results from the formation of interstitial hydrides. Hydrides of this type form according to either one of two main mechanisms. The first mechanism involves the adsorption of dihydrogen, succeeded by the cleaving of the H-H bond, the delocalisation of the hydrogen's electrons, and finally, the diffusion of the protons into the metal lattice. The other main mechanism involves the electrolytic reduction of ionised hydrogen on the surface of the metal lattice, also followed by the diffusion of the protons into the lattice. The second mechanism is responsible for the observed temporary volume expansion of certain electrodes used in electrolytic experiments

- ▶ Segregate from alcohol, water.
- ▶ Reacts slowly with water.
- ▶ **CAUTION** contamination with moisture will liberate explosive hydrogen gas, causing pressure build up in sealed containers.
- ▶ Reacts violently with caustic soda, other alkalis - generating heat, highly flammable hydrogen gas.
- ▶ If alkali is dry, heat generated may ignite hydrogen - if alkali is in solution may cause violent foaming
- ▶ Moisture sensitive
- ▶ Store under argon

SECTION 8 Exposure controls / personal protection

Control parameters

Occupational Exposure Limits (OEL)

INGREDIENT DATA

Not Available

Emergency Limits

| Ingredient | TEEL-1 | TEEL-2 | TEEL-3 |
|------------------------------|---------------|---------------|---------------|
| Sodium triacetoxyborohydride | Not Available | Not Available | Not Available |

| Ingredient | Original IDLH | Revised IDLH |
|------------------------------|---------------|---------------|
| Sodium triacetoxyborohydride | Not Available | Not Available |

Occupational Exposure Banding

| Ingredient | Occupational Exposure Band Rating | Occupational Exposure Band Limit |
|------------------------------|-----------------------------------|---|
| Sodium triacetoxyborohydride | C | > 0.1 to ≤ milligrams per cubic meter of air (mg/m ³) |

Notes:

Occupational exposure banding is a process of assigning chemicals into specific categories or bands based on a chemical's potency and the adverse health outcomes associated with exposure. The output of this process is an occupational exposure band (OEB), which corresponds to a range of exposure concentrations that are expected to protect worker health.

Exposure controls

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| Appropriate engineering controls | <p>For large scale or continuous use:</p> <ul style="list-style-type: none"> ▶ Spark-free, earthed ventilation system, venting directly to the outside and separate from usual ventilation systems ▶ Provide dust collectors with explosion vents <p>Metal dusts must be collected at the source of generation as they are potentially explosive.</p> <ul style="list-style-type: none"> ▶ Avoid ignition sources. ▶ Good housekeeping practices must be maintained. ▶ Dust accumulation on the floor, ledges and beams can present a risk of ignition, flame propagation and secondary explosions. ▶ Do not use compressed air to remove settled materials from floors, beams or equipment ▶ Vacuum cleaners, of flame-proof design, should be used to minimise dust accumulation. ▶ Use non-sparking handling equipment, tools and natural bristle brushes. Cover and reseal partially empty containers. Provide grounding and bonding where necessary to prevent accumulation of static charges during metal dust handling and transfer operations. ▶ Do not allow chips, fines or dusts to contact water, particularly in enclosed areas. ▶ Metal spraying and blasting should, where possible, be conducted in separate rooms. This minimises the risk of supplying oxygen, in the form of metal oxides, to potentially reactive finely divided metals such as aluminium, zinc, magnesium or titanium. ▶ Work-shops designed for metal spraying should possess smooth walls and a minimum of obstructions, such as ledges, on which dust accumulation is possible. ▶ Wet scrubbers are preferable to dry dust collectors. ▶ Bag or filter-type collectors should be sited outside the workrooms and be fitted with explosion relief doors. ▶ Cyclones should be protected against entry of moisture as reactive metal dusts are capable of spontaneous combustion in humid or partially wetted states. ▶ Local exhaust systems must be designed to provide a minimum capture velocity at the fume source, away from the worker, of 0.5 metre/sec. |
|---|---|

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- ▶ Local ventilation and vacuum systems must be designed to handle explosive dusts. Dry vacuum and electrostatic precipitators must not be used, unless specifically approved for use with flammable/ explosive dusts.

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: |
| welding, brazing fumes (released at relatively low velocity into moderately still air) | 0.5-1.0 m/s (100-200 f/min.) |

Within each range the appropriate value depends on:

| Lower end of the range | Upper end of the range |
|--|----------------------------------|
| 1: Room air currents minimal or favourable 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 1-2.5 m/s (200-500 f/min.) for extraction of gases discharged 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.

Individual protection measures, such as personal protective equipment



Eye and face protection

- ▶ Chemical goggles. [AS/NZS 1337.1, EN166 or national equivalent]
- ▶ Full face shield may be required for supplementary but never for primary protection of eyes.
- ▶ Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lenses 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 removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59].

Skin protection

See Hand protection below

Hands/feet protection

The selection of suitable gloves does not only depend on the material, but also on further marks of quality which vary from manufacturer to manufacturer. Where the chemical is a preparation of several substances, the resistance of the glove material can not be calculated in advance and has therefore to be checked prior to the application.

The exact break through time for substances has to be obtained from the manufacturer of the protective gloves and has to be observed when making a final choice.

Personal hygiene is a key element of effective hand care. 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.

Suitability and durability of glove type is dependent on usage. Important factors in the selection of gloves include:

- 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, AS/NZS 2161.1 or national equivalent).

- 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, AS/NZS 2161.10.1 or national equivalent) 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, AS/NZS 2161.10.1 or national equivalent) is recommended.

- Some glove polymer types are less affected by movement and this should be taken into account when considering gloves for long-term use.

- Contaminated gloves should be replaced.

As defined in ASTM F-739-96 in any application, gloves are rated as:

- Excellent when breakthrough time > 480 min
- Good when breakthrough time > 20 min
- Fair when breakthrough time < 20 min
- Poor when glove material degrades

For general applications, gloves with a thickness typically greater than 0.35 mm, are recommended.

It should be emphasised that glove thickness is not necessarily a good predictor of glove resistance to a specific chemical, as the permeation efficiency of the glove will be dependent on the exact composition of the glove material. Therefore, glove selection should also be based on consideration of the task requirements and knowledge of breakthrough times.

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| | <p>Glove thickness may also vary depending on the glove manufacturer, the glove type and the glove model. Therefore, the manufacturers technical data should always be taken into account to ensure selection of the most appropriate glove for the task.</p> <p>Note: Depending on the activity being conducted, gloves of varying thickness may be required for specific tasks. For example:</p> <ul style="list-style-type: none"> · Thinner gloves (down to 0.1 mm or less) may be required where a high degree of manual dexterity is needed. However, these gloves are only likely to give short duration protection and would normally be just for single use applications, then disposed of. · Thicker gloves (up to 3 mm or more) may be required where there is a mechanical (as well as a chemical) risk i.e. where there is abrasion or puncture potential <p>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.</p> <ul style="list-style-type: none"> ▸ Wear physical protective gloves, e.g. leather. ▸ Wear safety footwear. |
| Body protection | See Other protection below |
| Other protection | <ul style="list-style-type: none"> ▸ Overalls. ▸ Eyewash unit. ▸ Barrier cream. ▸ Skin cleansing cream. ▸ Some plastic personal protective equipment (PPE) (e.g. gloves, aprons, overshoes) are not recommended as they may produce static electricity. ▸ For large scale or continuous use wear tight-weave non-static clothing (no metallic fasteners, cuffs or pockets). ▸ Non sparking safety or conductive footwear should be considered. Conductive footwear describes a boot or shoe with a sole made from a conductive compound chemically bound to the bottom components, for permanent control to electrically ground the foot and shall dissipate static electricity from the body to reduce the possibility of ignition of volatile compounds. Electrical resistance must range between 0 to 500,000 ohms. Conductive shoes should be stored in lockers close to the room in which they are worn. Personnel who have been issued conductive footwear should not wear them from their place of work to their homes and return. |

Respiratory protection

Type -P Filter of sufficient capacity. (AS/NZS 1716 & 1715, EN 143:2000 & 149:2001, ANSI Z88 or national equivalent)

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

* - Negative pressure demand ** - Continuous flow

A(All classes) = Organic vapours, B AUS or B1 = Acid gasses, B2 = Acid gas or hydrogen cyanide(HCN), B3 = Acid gas or hydrogen cyanide(HCN), E = Sulfur dioxide(SO₂), G = Agricultural chemicals, K = Ammonia(NH₃), Hg = Mercury, NO = Oxides of nitrogen, MB = Methyl bromide, AX = Low boiling point organic compounds(below 65 degC)

- 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.
- Where protection from nuisance levels of dusts are desired, use type N95 (US) or type P1 (EN143) dust masks. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU)
- Use approved positive flow mask if significant quantities of dust becomes airborne.
- Try to avoid creating dust conditions.

SECTION 9 Physical and chemical properties

Information on basic physical and chemical properties

| | | | |
|-----------------------|---------------|--|---------------|
| Appearance | Not Available | | |
| Physical state | Solid | Relative density (Water = 1) | Not Available |
| Odour | Not Available | Partition coefficient n-octanol / water | Not Available |

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|---|---------------|---|----------------|
| Odour threshold | Not Available | Auto-ignition temperature (°C) | Not Available |
| pH (as supplied) | Not Available | Decomposition temperature (°C) | Not Available |
| Melting point / freezing point (°C) | 116-120(dec.) | Viscosity (cSt) | Not Available |
| Initial boiling point and boiling range (°C) | Not Available | Molecular weight (g/mol) | Not Available |
| Flash point (°C) | Not Available | Taste | Not Available |
| Evaporation rate | Not Available | Explosive properties | Not Available |
| Flammability | Not Available | Oxidising properties | Not Available |
| Upper Explosive Limit (%) | Not Available | Surface Tension (dyn/cm or mN/m) | Not Applicable |
| Lower Explosive Limit (%) | Not Available | Volatile Component (%vol) | Not Available |
| Vapour pressure (kPa) | Not Available | Gas group | Not Available |
| Solubility in water | Not Available | pH as a solution (1%) | Not Available |
| Vapour density (Air = 1) | Not Available | VOC g/L | Not Available |

SECTION 10 Stability and reactivity

| | |
|---|--|
| Reactivity | See section 7 |
| Chemical stability | <ul style="list-style-type: none"> ▶ Unstable in the presence of incompatible materials. ▶ Product is considered stable. ▶ Hazardous polymerisation will not occur. |
| Possibility of hazardous reactions | See section 7 |
| Conditions to avoid | See section 7 |
| Incompatible materials | See section 7 |
| Hazardous decomposition products | See section 5 |

SECTION 11 Toxicological information

Information on toxicological effects

| | |
|---------------------|--|
| Inhaled | <p>The material can cause respiratory irritation in some persons. The body's response to such irritation can cause further lung damage.</p> <p>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.</p> <p>If prior damage to the circulatory or nervous systems has occurred or if kidney damage has been sustained, proper screenings should be conducted on individuals who may be exposed to further risk if handling and use of the material result in excessive exposures.</p> |
| Ingestion | <p>The material can produce chemical burns within the oral cavity and gastrointestinal tract following ingestion.</p> <p>The material has NOT been classified by EC Directives or other classification systems as "harmful by ingestion". This is because of the lack of corroborating animal or human evidence.</p> |
| Skin Contact | <p>The material can produce chemical burns following direct contact with the skin.</p> <p>Skin contact is not thought to have harmful health effects (as classified under EC Directives); the material may still produce health damage following entry through wounds, lesions or abrasions.</p> <p>Open cuts, abraded or irritated skin should not be exposed to this material</p> <p>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.</p> |
| Eye | <p>The material can produce chemical burns to the eye following direct contact. Vapours or mists may be extremely irritating.</p> |

Sodium triacetoxymborohydride

| | |
|----------------|--|
| Chronic | <p>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. Long-term exposure to respiratory irritants may result in airways disease, involving difficulty breathing and related whole-body problems.</p> <p>Substance accumulation, in the human body, may occur and may cause some concern following repeated or long-term occupational exposure.</p> |
|----------------|--|

| | |
|----------------|---|
| Legend: | 1. Value obtained from Europe ECHA Registered Substances - Acute toxicity 2. Value obtained from manufacturer's SDS. Unless otherwise specified data extracted from RTECS - Register of Toxic Effect of chemical Substances |
|----------------|---|

| | |
|--------------------------------------|--|
| Sodium triacetoxymborohydride | <p>Asthma-like symptoms may continue for months or even years after exposure to the material ends. This may be due to a non-allergic condition known as reactive airways dysfunction syndrome (RADS) which can occur after exposure to high levels of highly irritating compound. Main criteria for diagnosing RADS include the absence of previous airways disease in a non-atopic individual, with sudden onset of persistent asthma-like symptoms within minutes to hours of a documented exposure to the irritant. Other criteria for diagnosis of RADS include a reversible airflow pattern on lung function tests, moderate to severe bronchial hyperreactivity on methacholine challenge testing, and the lack of minimal lymphocytic inflammation, without eosinophilia. 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. On the other hand, industrial bronchitis is a disorder that occurs as a result of exposure due to high concentrations of irritating substance (often particles) and is completely reversible after exposure ceases. The disorder is characterized by difficulty breathing, cough and mucus production.</p> |
|--------------------------------------|--|

| | | | |
|--|---|---------------------------------|---|
| Acute Toxicity | ✗ | Carcinogenicity | ✗ |
| Skin Irritation/Corrosion | ✔ | Reproductivity | ✗ |
| Serious Eye Damage/Irritation | ✔ | STOT - Single Exposure | ✗ |
| Respiratory or Skin sensitisation | ✗ | STOT - Repeated Exposure | ✗ |
| Mutagenicity | ✗ | Aspiration Hazard | ✗ |

Legend: ✗ – Data either not available or does not fill the criteria for classification
✔ – Data available to make classification

SECTION 12 Ecological information

Toxicity

| | |
|----------------|--|
| Legend: | Extracted from 1. IUCLID Toxicity Data 2. Europe ECHA Registered Substances - Ecotoxicological Information - Aquatic Toxicity 4. US EPA, Ecotox database - Aquatic Toxicity Data 5. ECETOC Aquatic Hazard Assessment Data 6. NITE (Japan) - Bioconcentration Data 7. METI (Japan) - Bioconcentration Data 8. Vendor Data |
|----------------|--|

DO NOT discharge into sewer or waterways.

Persistence and degradability

| Ingredient | Persistence: Water/Soil | Persistence: Air |
|------------|---------------------------------------|---------------------------------------|
| | No Data available for all ingredients | No Data available for all ingredients |

Bioaccumulative potential

| Ingredient | Bioaccumulation |
|------------|---------------------------------------|
| | No Data available for all ingredients |

Mobility in soil

| Ingredient | Mobility |
|------------|---------------------------------------|
| | No Data available for all ingredients |

SECTION 13 Disposal considerations

Waste treatment methods

Sodium triacetoxymborohydride

| | |
|-------------------------------------|---|
| Product / Packaging disposal | <p>For small quantities:</p> <ul style="list-style-type: none"> ▸ Cautiously add the material to dry butanol in an appropriate solvent. ▸ Reaction may be vigorous and exothermic. ▸ Large volumes of flammable hydrogen may be generated and venting procedures should be conducted in a flame-proof environment. ▸ Neutralise the solution with aqueous acid, filter and burn the liquid portion in an approved incinerator. ▸ Recycle wherever possible. ▸ Consult manufacturer for recycling options or consult local or regional waste management authority for disposal if no suitable treatment or disposal facility can be identified. ▸ Dispose of by: burial in a land-fill specifically licensed to accept chemical and / or pharmaceutical wastes 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 Transport information

Labels Required

| | |
|---|----|
|  | |
| Marine Pollutant | NO |

Land transport (ADR-RID)

| | | |
|-------------------------------------|---|----------------|
| UN number or ID number | 1409 | |
| UN proper shipping name | METAL HYDRIDES, WATER- REACTIVE, N.O.S. | |
| Transport hazard class(es) | Class | 4.3 |
| | Subsidiary risk | Not Applicable |
| Packing group | II | |
| Environmental hazard | Not Applicable | |
| Special precautions for user | Hazard identification (Kemler) | 423 |
| | Classification code | W2 |
| | Hazard Label | 4.3 |
| | Special provisions | 274 508 |
| | Limited quantity | 500 g |
| | Tunnel Restriction Code | 2 (D/E) |

Air transport (ICAO-IATA / DGR)

| | | |
|-------------------------------------|---|----------------|
| UN number | 1409 | |
| UN proper shipping name | Metal hydrides, water-reactive, n.o.s. * | |
| Transport hazard class(es) | ICAO/IATA Class | 4.3 |
| | ICAO / IATA Subrisk | Not Applicable |
| | ERG Code | 4W |
| Packing group | II | |
| Environmental hazard | Not Applicable | |
| Special precautions for user | Special provisions | Not Applicable |
| | Cargo Only Packing Instructions | 490 |
| | Cargo Only Maximum Qty / Pack | 50 kg |
| | Passenger and Cargo Packing Instructions | 484 |
| | Passenger and Cargo Maximum Qty / Pack | 15 kg |
| | Passenger and Cargo Limited Quantity Packing Instructions | Y475 |
| | Passenger and Cargo Limited Maximum Qty / Pack | 5 kg |

Sodium triacetoxymborohydride

Sea transport (IMDG-Code / GGVSee)

| | | |
|------------------------------|--|----------------|
| UN number | 1409 | |
| UN proper shipping name | METAL HYDRIDES, WATER-REACTIVE, N.O.S. | |
| Transport hazard class(es) | IMDG Class | 4.3 |
| | IMDG Subrisk | Not Applicable |
| Packing group | II | |
| Environmental hazard | Not Applicable | |
| Special precautions for user | EMS Number | F-G, S-L |
| | Special provisions | 274 |
| | Limited Quantities | 500 g |

Inland waterways transport (ADN)

| | | |
|------------------------------|--|----------------|
| UN number | 1409 | |
| UN proper shipping name | METAL HYDRIDES, WATER-REACTIVE, N.O.S. | |
| Transport hazard class(es) | 4.3 | Not Applicable |
| Packing group | II | |
| Environmental hazard | Not Applicable | |
| Special precautions for user | Classification code | W2 |
| | Special provisions | 274; 508 |
| | Limited quantity | 500 g |
| | Equipment required | PP, EX, A |
| | Fire cones number | 0 |

Transport in bulk according to Annex II of MARPOL and the IBC code

Not Applicable

Transport in bulk in accordance with MARPOL Annex V and the IMSBC Code

| Product name | Group |
|-------------------------------|---------------|
| Sodium triacetoxymborohydride | Not Available |

Transport in bulk in accordance with the IGC Code

| Product name | Ship Type |
|-------------------------------|---------------|
| Sodium triacetoxymborohydride | Not Available |

SECTION 15 Regulatory information

Safety, health and environmental regulations / legislation specific for the substance or mixture

Sodium triacetoxymborohydride is found on the following regulatory lists

Europe EC Inventory

National Inventory Status

| National Inventory | Status |
|---|------------------------------------|
| Australia - AIIC / Australia Non-Industrial Use | No (Sodium triacetoxymborohydride) |
| Canada - DSL | No (Sodium triacetoxymborohydride) |
| Canada - NDSL | No (Sodium triacetoxymborohydride) |
| China - IECSC | No (Sodium triacetoxymborohydride) |

Sodium triacetoxymborohydride

| National Inventory | Status |
|-------------------------------|--|
| Europe - EINEC / ELINCS / NLP | No (Sodium triacetoxymborohydride) |
| Japan - ENCS | Yes |
| Korea - KECI | No (Sodium triacetoxymborohydride) |
| New Zealand - NZIoC | Yes |
| Philippines - PICCS | No (Sodium triacetoxymborohydride) |
| USA - TSCA | Yes |
| Taiwan - TCSI | Yes |
| Mexico - INSQ | No (Sodium triacetoxymborohydride) |
| Vietnam - NCI | Yes |
| Russia - FBEPH | No (Sodium triacetoxymborohydride) |
| Legend: | <p>Yes = All CAS declared ingredients are on the inventory</p> <p>No = One or more of the CAS listed ingredients are not on the inventory. These ingredients may be exempt or will require registration.</p> |

SECTION 16 Other information

| | |
|---------------|------------|
| Revision Date | 06/07/2023 |
| Initial Date | 06/07/2023 |

SDS Version Summary

| Version | Date of Update | Sections Updated |
|---------|----------------|---|
| 1.2 | 06/07/2023 | Toxicological information - Acute Health (eye), Toxicological information - Acute Health (inhaled), Toxicological information - Acute Health (skin), Toxicological information - Acute Health (swallowed), Physical and chemical properties - Appearance, CAS Number, Toxicological information - Chronic Health, Hazards identification - Classification, Disposal considerations - Disposal, Exposure controls / personal protection - Engineering Control, Ecological Information - Environmental, Exposure controls / personal protection - Exposure Standard, Firefighting measures - Fire Fighter (fire fighting), Firefighting measures - Fire Fighter (fire incompatibility), First Aid measures - First Aid (eye), First Aid measures - First Aid (inhaled), First Aid measures - First Aid (skin), First Aid measures - First Aid (swallowed), Handling and storage - Handling Procedure, Composition / information on ingredients - Ingredients, Stability and reactivity - Instability Condition, Korean MSDS Number, Exposure controls / personal protection - Personal Protection (eye), Exposure controls / personal protection - Personal Protection (hands/feet), Accidental release measures - Spills (major), Accidental release measures - Spills (minor), Handling and storage - Storage (storage incompatibility), Handling and storage - Storage (storage requirement), Handling and storage - Storage (suitable container), Identification of the substance / mixture and of the company / undertaking - Supplier Information, Identification of the substance / mixture and of the company / undertaking - Synonyms, Transport information - Transport |

Other information

Classification of the preparation 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.

The 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.

For detailed advice on Personal Protective Equipment, refer to the following EU CEN Standards:

- EN 166 Personal eye-protection
- EN 340 Protective clothing
- EN 374 Protective gloves against chemicals and micro-organisms
- EN 13832 Footwear protecting against chemicals
- EN 133 Respiratory protective devices

Definitions and abbreviations

- PC - TWA: Permissible Concentration-Time Weighted Average
- PC - STEL: Permissible Concentration-Short Term Exposure Limit
- IARC: International Agency for Research on Cancer
- ACGIH: American Conference of Governmental Industrial Hygienists
- STEL: Short Term Exposure Limit
- TEEL: Temporary Emergency Exposure Limit,
- IDLH: Immediately Dangerous to Life or Health Concentrations
- ES: Exposure Standard
- OSF: Odour Safety Factor

Sodium triacetoxymborohydride

NOAEL :No Observed Adverse Effect Level
 LOAEL: Lowest Observed Adverse Effect Level
 TLV: Threshold Limit Value
 LOD: Limit Of Detection
 OTV: Odour Threshold Value
 BCF: BioConcentration Factors
 BEI: Biological Exposure Index
 AIIC: Australian Inventory of Industrial Chemicals
 DSL: Domestic Substances List
 NDSL: Non-Domestic Substances List
 IECSC: Inventory of Existing Chemical Substance in China
 EINECS: European INventory of Existing Commercial chemical Substances
 ELINCS: European List of Notified Chemical Substances
 NLP: No-Longer Polymers
 ENCS: Existing and New Chemical Substances Inventory
 KECl: Korea Existing Chemicals Inventory
 NZIoC: New Zealand Inventory of Chemicals
 PICCS: Philippine Inventory of Chemicals and Chemical Substances
 TSCA: Toxic Substances Control Act
 TCSI: Taiwan Chemical Substance Inventory
 INSQ: Inventario Nacional de Sustancias Químicas
 NCI: National Chemical Inventory
 FBEPH: Russian Register of Potentially Hazardous Chemical and Biological Substances

Classification and procedure used to derive the classification for mixtures according to Regulation (EC) 1272/2008 [CLP]

| Classification according to regulation (EC) No 1272/2008 [CLP] and amendments | Classification Procedure |
|---|---------------------------------|
| Skin Corrosion/Irritation Category 1B, H314 | Calculation method |
| Serious Eye Damage/Eye Irritation Category 1, H318 | Expert judgement |
| Flammable Solids Category 2, H228 | Expert judgement |
| Substances and Mixtures which in Contact with Water Emit Flammable Gases Category 2, H261 | Expert judgement |