Sodium Borohydride
NaBH$_4$
Sodium Borohydride NaBH₄

EFFECTIVE AND SELECTIVE REDUCING AGENT

NaBH₄ is very effective and selective reducing agent. It is widely used in its dry form (white crystalline powder or granules) by the pharmaceutical and fine chemical industry in applications where an excellent hydrogenation and reduction is needed. The reductions can be carried out with a wide range of carbonyl substrates and the products are often building blocks especially for the synthesis of pharmaceutically active compounds.

NaBH₄ is also used to purify organic chemicals by removing metal ions, carbonyl and peroxide impurities that causes undesirable odor, taste, color and instability to products.

Sodium borohydride is also easy to handle when the appropriate safety precautions are followed. It is not necessary to exclude moisture nor atmospheric oxygen when using NaBH₄. The sodium borohydride consumed by water present in the reaction mixture usually do not have unfavourable effects on the desired reduction, provided that there is sufficient borohydride present. This is the main reason why a slight excess of sodium borohydride is used customarily in reduction reactions.

NaBH₄ is above all used for reducing aldehydes and ketones. Aldehydes can be reduced selectively in the presence of ketones. In alcoholic media or THF sodium borohydride reduces for example halides, anhydrides, quartenary pyridinium salts, double bonds conjugated to two electron-withdrawing groups and C-Hg bonds. It leaves under ambient conditions epoxides, esters and lactones, carboxylic acids, amides and most nitro compounds unreacted.

The reactivity of NaBH₄ can be enhanced by the additives. In the presence of organic acids NaBH₄ forms acyloxyborohydrides, either monoacyloxy (Na(RCOO)BH₄) or triacyloxyborohydrides (Na(RCOO)₂BH) depending on the quantity of organic acid (RCOOH) present.

REDUCTION OF ORGANIC COMPOUNDS

In organic reactions the reduction occurs on the carbon atom having the highest positive partial charge. The rate of reduction is increased by any substituent that increases the partial positive charge of the carbonyl carbon. The reductions of carbonyl groups by borohydride occur mostly by nucleophilic attack of hydride on the carbonyl carbon.

The basic reduction mechanism of sodium borohydride.

\[
4 \left( \begin{array}{c}
  R \\
  \text{C} = \text{O} \\
\end{array} \right) + \text{BH}_4^- \xrightleftharpoons{4 \text{H}_2\text{O/ROH}} 4 \left( \begin{array}{c}
  R \\
  \text{C} \xrightarrow{\text{OH}} \\
\end{array} \right)
\]

The mechanism shows that 1 mol of NaBH₄ can reduce as many as four molecules of a carbonyl compound. Four molecules of water or alcohol is needed to hydrolyze the formed tetraalkoxyborate. Because NaBH₄ is highly reactive to positive charge of the carbonyl carbon, the aldehydes can be reduced selectively in the presence of other functional groups, for example ketones, esters, imides and nitriles.

OTHER APPLICATIONS

Organoboranes

Organoboranes are prepared by borane (BH₃) which undergoes rapid and quantitative hydroboration with most alkenes to form organoboranes (R₂BH). Organoboranes are important reactive intermediate products widely used in organic synthesis, e.g the reduction of α-amino acids to α-amino alcohols as these are important intermediates in the synthesis of many pharmaceutically active compounds.
The borane needed for the reaction is often prepared in situ by the reaction of NaBH₄ and Lewis acid such as BF₃, AlCl₃, I₂, or Me₃SiCl.

$$2 \text{NaBH}_4 + \text{I}_2 \text{diglyme} \rightarrow 2 \text{NaI} + \text{B}_2\text{H}_6 + \text{H}_2$$

The reaction produces diborane ($\text{B}_2\text{H}_6$), which is a gaseous dimeric form of borane. Borane is generally employed as a solvate with THF or Me₂S.

**Organometallic reactions**

The applications of sodium borohydride on organometallic reactions can in general be divided on four major types:

1) initial formation of organometallic compounds and complexes
2) reductions to lower-valent metal compounds
3) demetallation or cleavage of organometallic compounds to the metal and organic species, e.g. reduction of organomercurials to saturated functionalized compounds
4) conversion of organometallic halides to the corresponding hydride or hydride halide.

**Metal cations reductions**

Sodium borohydride solution is used to purify waste waters and product streams by reducing soluble metal ions to insoluble elemental metals, which may then be separated from the solution by filtration or decantation. Toxic and valuable heavy metals such as lead, mercury, gold, silver, and platinum are recovered by NaBH₄ reduction. When sodium borohydride is dissolved in a suitable solvent, eight electrons per molecule become available for reduction.

$$\text{NaBH}_4 + 2 \text{H}_2\text{O} \rightarrow \text{NaBH}_4 + 8 \text{H}^+ + 8 \text{e}^-$$

$$8 \text{Me}^+ + 8 \text{e}^- \rightarrow 8 \text{Me}^0$$

Theoretically the following quantities of metals can be reduced by 1 kg of sodium borohydride, but in practice certain additional dosages of NaBH₄ are needed to gain good yields. When the conditions are right, the efficiency is good and reduction complete.

<table>
<thead>
<tr>
<th>METAL</th>
<th>kg metal/kg NaBH₄</th>
<th>kg NaBH₄/kg metal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cadmium</td>
<td>Cd²⁺</td>
<td>11,9</td>
</tr>
<tr>
<td>Cobalt</td>
<td>Co²⁺</td>
<td>6,2</td>
</tr>
<tr>
<td>Copper</td>
<td>Cu²⁺</td>
<td>6,7</td>
</tr>
<tr>
<td>Gold</td>
<td>Au⁺⁺</td>
<td>13,7</td>
</tr>
<tr>
<td>Iridium</td>
<td>Ir⁴⁺</td>
<td>10,1</td>
</tr>
<tr>
<td>Lead</td>
<td>Pb²⁺</td>
<td>21,9</td>
</tr>
<tr>
<td>Mercury</td>
<td>Hg²⁺</td>
<td>21,2</td>
</tr>
<tr>
<td>Nickel</td>
<td>Ni²⁺</td>
<td>6,2</td>
</tr>
<tr>
<td>Platinium</td>
<td>Pt⁴⁺</td>
<td>10,3</td>
</tr>
<tr>
<td>Rhodium</td>
<td>Rh³⁺</td>
<td>7,2</td>
</tr>
<tr>
<td>Silver</td>
<td>Ag⁺</td>
<td>22,8</td>
</tr>
</tbody>
</table>
**Chemical and Physical Properties**

Chemical name: Sodium borohydride  
Chemical formula: \( \text{NaBH}_4 \)  
Molecular weight: 37.84 g/mol  
Purity: min 98%  

**Typical content**

- \( \text{NaBH}_4 \): 98.4 – 99.5%  
- \( \text{NaBO}_2 \): < 1.5%  
- \( \text{NaOH} \): < 0.1%  
- \( \text{H}_2\text{O} \): < 0.1%  

Theoretical hydrogen content: 10.6 w-%

**Typical properties**

- Appearance: white crystalline solid  
- Bulk density:  
  - approx. 400 kg/m\(^3\) for powder  
  - 510 kg/m\(^3\) for granules  
  - 550 kg/m\(^3\) for tablets  
- Melting point: ~ 500 °C at 2 – 6 bar \( \text{H}_2 \)  
- Decomposes: above 400 °C in vacuum  
- Crystal form (anhydrous): face centered cubic (NaCl structure)  
  \( a_0 = 6.14 \text{ Å} \)

**Analytical Methods**

Sodium borohydride assay can be determined by either iodometric titration or gas evolution method. We will be glad to provide further information of these analysis methods.

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**Solvability in Water**

Sodium borohydride crystallizes in dihydrate form in water on temperatures below 36.4 °C and in anhydrous form on temperatures over it. The following diagram shows the equilibrium temperature of the two crystal forms of \( \text{NaBH}_4 \).

![Sodium Borohydride Solubility in Water](image)

**Solvability in Organic Solvents**

Sodium borohydride is soluble in most polar solvents that contain a hydroxyl or an amine group. Appendix 1 contains more information about the solubility of \( \text{NaBH}_4 \).

The stability of sodium borohydride in organic solvents is dependent on the degree of hydrolysis that can occur. Sodium borohydride instability in lower alcohols (methanol, ethanol) can be overcome by the addition of base. The presence of water accelerates hydrolysis reaction.

![Stability of Sodium Borohydride](image)
**FIRST AID**

Dry sodium borohydride products are corrosive to the eyes, skin and respiratory tract. Moisture increases the toxicity and can result in severe irritation and skin burns.

**Inhalation**

Move to fresh air and rinse mouth with water. Consult a physician.

**Eye contact**

Rinse thoroughly with running water for at least 15 minutes and consult a physician.

**Skin contact**

Wash off immediately with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Cleanse skin with soap and water including hair and under fingernails. If irritation develops, consult a physician.

**Ingestion**

Rinse mouth with water and immediately give several glasses of water to drink. Seek medical advise immediately. Prevent vomiting if possible.

**DISPOSAL**

Dispose sodium borohydride according to the local legislation. Small amounts of sodium borohydride can be disposed by dilution with large excess of water followed by slowly adding dilute acetic acid or acetone solution to the neutral pH. Do not flush sodium borohydride into the sewer. The procedure must be carried out carefully in a well-ventilated place because of the liberating hydrogen gas by exothermic hydrolysis reaction.

\[
\text{NaBH}_4 + 2 \text{H}_2\text{O} \rightarrow \text{NaBO}_2 + 4 \text{H}_2 \quad \Delta H^\circ = -218 \text{kJ mol}^{-1}
\]

**DELIVERY AND TRANSPORT REGULATIONS**

**Standard packaging**

10-kg plastic bags in steel drums of 10 kg, 40 kg or 50 kg

**Transport regulations**

- **UN No**: 1426
- **IMDG class**: 4.3/I
- **ADR/RID class**: 4.3/I
- **ICAO/IATA**: 4.3/I CAO 412, PAX F

**Toxicity**

- **LD**\(_{50}\): 18 mg/kg ipr/rat
- 4 – 8 g/kg dermal/rabbit

- **CAS No**: 16940-66-2
- **EINECS No**: 241-004-4

**HANDLING AND STORAGE**

NaBH\(_4\) is safe to handle and use when certain normal industrial safety regulations are followed. It is chemically stable under normal conditions and in unopened drums. Sodium borohydride must be stored in closed vessels in a dry, cool and well-ventilated area, where the relative humidity in the air is preferably smaller than 20%.

It must be kept separate from
- acids
- oxidizing substances
- heavy metal salts
- open fire and heat sources.

NaBH\(_4\) may liberate hydrogen gas even violently or explosively when reacting with oxidizers, acids, heavy metals or heavy metal salts. A contact with moisture, water or steam causes gradual decomposition of the product and a slow release of hydrogen. Hydrogen is highly flammable and can form an explosive mixture with air. Reactions with acids or in acidic conditions borohydride products can generate heat and liberate hydrogen gas.

The powder ignites from free flame in the air and will continue to burn as hydrogen is evolved from the decomposition. If it has caught fire, do not use water or carbon dioxide for extinguishing. Dry sand, powdered limestone or dry extinguishers with sodium chloride or anhydrous sodium carbonate are most suitable.

Protective clothing, plastic or rubber gloves and boots, eye or face protector and dust mask shall always be used when handling the product. Also sufficient ventilation is recommended.

Before using sodium borohydride please check carefully the information on handling and precautions from the Safety Data Sheet of our product. The instructions of the local authorities are to be observed.
Sodium Borohydride NaBH₄ Solution

CHEMICAL AND PHYSICAL PROPERTIES

Typical content
NaBH₄ 12.0 %
NaOH 40.0 %
balance H₂O

Alkalinity
pH approx. 14

Appearance
Colorless liquid

Crystallizes below 10 °C (50 °F), can be liquefied again by warming slowly.

Sodium borohydride density and viscosity varies at different temperatures.

We also prepare sodium borohydride solutions for customers’ special needs, for example Hydrifin C concentrate containing 20 % NaBH₄, and 20 % NaOH, balance water.

STABILITY

The stability of sodium borohydride in solution that contains water is dependent on the temperature and pH of the solution. The hydrolysis reaction occurs evolving hydrogen gas decreasing the stability of sodium borohydride, when temperature is increased or pH is lowered.

Stability of sodium borohydride 12% solution at different temperatures.

The pH rose from the starting pH values 9 and 10 to near pH 11 during the decomposition reaction. The increase of the pH was caused by the formation of the strongly basic metaborate ion and it effected by decreasing the initial rate of hydrogen evolution.

\[
\text{BH}_4^- \rightarrow 2 \text{H}_2 \text{O} \rightarrow 4 \text{H}_2 \text{O} + \text{BO}_3^- + 2 \text{H}_2
\]

DELIVERY AND TRANSPORT REGULATIONS

Packaging
Bulk tank containers
IBC -containers 1400 kg
PE-plastic drums 300 kg

Packaging materials
Suitable materials for storage tanks and vessels are stainless steel as well as alkaline resistant plastics. Aluminium and zinc are not acceptable.

Transport regulations
UN No 3320
IMDG class 8/II
ADR/RID class 8/II

Toxicity
The solution irritates and burns the skin and the mucous membranes. Very hazardous in contact with eyes.

NaBH₄
LD₅₀ 18 mg/kg ipr/rat
CAS No 16940-66-2
EINECS No 241-004-4

NaOH
LD₅₀ 140–340 mg/oral/rat
CAS No 1310-73-2
EINECS No 215-185-5
**HANDLING AND STORAGE**

Sodium borohydride solution is stable under normal conditions, the decomposition is less than 0.1 % per year. During long storage periods hydrogen may evolve solution into the space above. Keep the containers in cool, dry and well ventilated place away from water, acids (reacts vigorously generating heat and hydrogen gas), oxidizing substances (reacts violently or explosively) and chemically active metals (reacts releasing hydrogen).

A ventilation line out is recommended. All closed containers should have at least 10 % free volume and they should be checked periodically. The recommended storage temperature is 20 – 25 °C (68 – 77 °F). Recommended storage materials are stainless steel and alkaline resistant plastics. Check also the suitability of sealing materials with caustic.

Protective clothing, plastic or rubber gloves and boots and eye or face protector should always be used when handling the product. Please note that sodium borohydride solution is strongly alkaline and corrosive.

**DISPOSAL**

Dispose sodium borohydride solution according to the local legislation. Small amounts of sodium borohydride can be disposed by dilution with large excess of water and neutralization of the sodium hydroxide with dilute inorganic acids. Because flammable hydrogen gas is evolving during neutralization it should be done in a well ventilated area (fume hood) without open fire or any ignition sources nearby. The hydrolysis reaction is exothermic.

**FIRST AID**

The sodium borohydride solution irritates and burns the skin and the mucous membranes. It is especially hazardous in contact with eyes.

**Inhalation**
Move to fresh air and rinse mouth with water. Consult a physician.

**Eye contact**
Immediately rinse thoroughly with running water for at least 15 minutes and consult always a physician.

**Skin contact**
Wash off immediately with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Cleanse skin with soap and water including hair and under fingernails. If irritation develops consult a physician.

**Ingestion**
Rinse mouth with water and immediately give several glasses of water to drink. Seek medical advise immediately. Prevent vomiting if possible.

Before using sodium borohydride please check carefully the information on handling and precautions from the Safety Data Sheet of our product. The instructions of the local authorities are to be observed.
Sodium triacetoxyborohydride
NaBH(CH₃COO)₃
CAS Registry No.: 56553-60-7

Product description
Sodium triacetoxyborohydride is a mild and selective reducing agent. It is able to replace toxic sodium cyanoborohydride under most conditions. It is selective in reducing aldehydes to alcohols in the presence of ketones. STAB is also stable in anhydrous acids, which enables reductive amination of aldehydes and ketones. The advantage of STAB compared to sodium cyanoborohydride is evident. STAB, being non-toxic, is easier to handle and forms no toxic by-products, making the treatment of wastes after the reaction simple and less costly.

Product properties
- Sodium triacetoxyborohydride content: min 95 %
- Method of analysis: Gas-volumetric method
- Molecular weight: 211.94 g/mol
- Relative density: 1.374 kg/dm³
- Appearance: white powder

Delivery and transport regulations
Standard packing: 3 x 10 kg PE bag in steel drum. Delivery by road, sea and air.
- Shipping name: Sodium triacetoxy borohydride
- UN Number: 2813
- Hazard Class: 4.3
- Packing Group: I

Storage and handling
Keep tightly closed in a dry, cool and well-ventilated area. STAB decomposes in contact with water or moisture releasing flammable hydrogen gas. It also decomposes when heated above 80 °C. Keep away from open flames, hot surfaces and sources of ignition. Keep under nitrogen. Keep away from acids, oxidizing agents and alcohols.

Derivatives of Sodium Borohydride

Potassium Borohydride
KBH₄
CAS Registry No.: 13762-51-1

Product description
Potassium borohydride is a mild selective reducing agent with broad solubility in protic solvents. It is unique among the hydrides in being completely stable in air under normal atmospheric conditions. It differs from NaBH₄ by being non-hygroscopic and being thermally more stable and less reactive to oxidation. Hydrifin KBH is used as an alternative to Sodium borohydride NaBH₄ for its different solubility profile and in systems that do not tolerate the presence of sodium.

Product properties
- KBH₄ content: min 98.0 %
- Method of analysis: Determination of KBH₄ by iodate titration
- Molecular weight: 53.94 g/mol
- Bulk density: 0.400 kg/dm³
- Appearance: white powder

Delivery and transport regulations
Shipments all over the world by road, air and sea (container and single consignments).
- Shipping name: Potassium borohydride
- UN Number: 1870
- Hazard Class: 4.3
- Packing Group: I

Storage and handling
Hydrifin KBH has an unlimited lifetime under exclusion of air and humidity. It should be kept away from fire sources, acids, oxidizing agents and transition metal salts. Potassium borohydride is recommended to be kept in closed containers in a dry, cool and well ventilated area. In case of fire do not use water, carbon dioxide or halocarbon extinguishers.

Available on request:

Tetramethylammonium borohydride (TMAB)
CAS Registry No.: 16883-45-7

Tetrabutylammonium borohydride (TBAB)
CAS Registry No.: 33725-74-5

Before using borohydride products please check carefully the information on handling and precautions from the Safety Data Sheet of our products. The instructions of the local authorities are to be observed.
### Appendix 1. Solubility of sodium borohydride (g/100 g of solvent).

<table>
<thead>
<tr>
<th>Solvent</th>
<th>Boiling point of solvent °C</th>
<th>Temperature °C</th>
<th>Solubility g NaBH₄/100 g solvent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>100.0</td>
<td>0</td>
<td>25.0 (decomp.)³</td>
</tr>
<tr>
<td></td>
<td></td>
<td>25</td>
<td>55.0 (decomp.)³</td>
</tr>
<tr>
<td></td>
<td></td>
<td>60</td>
<td>88.4 (decomp.)³</td>
</tr>
<tr>
<td>Methanol</td>
<td>64.7</td>
<td>20</td>
<td>16.4 (decomp.)³</td>
</tr>
<tr>
<td></td>
<td>78.5</td>
<td>20</td>
<td>4.0 (decomp.)³</td>
</tr>
<tr>
<td>Ethanol</td>
<td>82.5</td>
<td>20</td>
<td>0.25</td>
</tr>
<tr>
<td></td>
<td></td>
<td>60</td>
<td>0.88</td>
</tr>
<tr>
<td>Isopropanol</td>
<td></td>
<td>20</td>
<td>0.11</td>
</tr>
<tr>
<td></td>
<td></td>
<td>60</td>
<td>0.18</td>
</tr>
<tr>
<td>Tert. Butanol</td>
<td>82.5</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>Tetrahydrofurfuryl Alcohol</td>
<td>177.0</td>
<td>20</td>
<td>14.0 (decomp.)³</td>
</tr>
<tr>
<td>Ammonia, liquid</td>
<td>-33.3</td>
<td>25</td>
<td>104.0</td>
</tr>
<tr>
<td>Methyl Amine</td>
<td>-6.5</td>
<td>-20</td>
<td>27.6</td>
</tr>
<tr>
<td>Dimethyl Amine</td>
<td>6.8</td>
<td>2</td>
<td>4.0</td>
</tr>
<tr>
<td>Ethyl Amine</td>
<td>16.6</td>
<td>17</td>
<td>20.9</td>
</tr>
<tr>
<td>Diethyl Amine</td>
<td>55.2</td>
<td>20</td>
<td>1.0</td>
</tr>
<tr>
<td>Triethyl Amine</td>
<td>89.3</td>
<td>20</td>
<td>1.0</td>
</tr>
<tr>
<td>N-propyl Amine</td>
<td>48.7</td>
<td>28</td>
<td>9.7</td>
</tr>
<tr>
<td>Isopropyl Amine</td>
<td>34.0</td>
<td>28</td>
<td>6.0</td>
</tr>
<tr>
<td>N-butyl Amine</td>
<td>77.8</td>
<td>28</td>
<td>4.9</td>
</tr>
<tr>
<td>Cyclohexyl Amine</td>
<td>134.5</td>
<td>28</td>
<td>1.8</td>
</tr>
<tr>
<td>Monoethanol Amine</td>
<td>170.0</td>
<td>25</td>
<td>7.7</td>
</tr>
<tr>
<td>Ethylene Diamine</td>
<td>118.0</td>
<td>75</td>
<td>22.0</td>
</tr>
<tr>
<td>Morpholine</td>
<td>128.3</td>
<td>25</td>
<td>1.4</td>
</tr>
<tr>
<td>Pyridine</td>
<td>115.3</td>
<td>25</td>
<td>3.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>75</td>
<td>3.4</td>
</tr>
<tr>
<td>Acetonitrile</td>
<td>82.0</td>
<td>28</td>
<td>0.9</td>
</tr>
<tr>
<td>Dimethyl Formamide (DMF)</td>
<td>153.0</td>
<td>20</td>
<td>18.0⁵</td>
</tr>
<tr>
<td>Dimethyl Sulfoxide (DMSO)</td>
<td>100.0</td>
<td>25</td>
<td>5.8 (decomp.)³</td>
</tr>
<tr>
<td>Tetrahydrofuran (THF)</td>
<td>65.0</td>
<td>20</td>
<td>0.1</td>
</tr>
<tr>
<td>Ethylene Glycol Dimethyl Ether (monoglyme)</td>
<td>85.0</td>
<td>0</td>
<td>2.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20</td>
<td>0.8</td>
</tr>
<tr>
<td>Diethylene Glycol Dimethyl Ether (diglyme)</td>
<td>162.0</td>
<td>0</td>
<td>1.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>25</td>
<td>5.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>40</td>
<td>11.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>45</td>
<td>8.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>75</td>
<td>0.0</td>
</tr>
<tr>
<td>Triethylene Glycol Dimethyl Ether (triglyme)</td>
<td>216.0</td>
<td>0</td>
<td>8.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>25</td>
<td>8.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>50</td>
<td>8.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>100</td>
<td>6.7</td>
</tr>
<tr>
<td>Tetraethylene glycol dimethyl ether (tetruglyme)</td>
<td>275.8</td>
<td>0</td>
<td>8.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>25</td>
<td>9.1</td>
</tr>
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<td></td>
<td></td>
<td>50</td>
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<td></td>
<td></td>
<td>75</td>
<td>8.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>100</td>
<td>4.2</td>
</tr>
<tr>
<td>Ethylene glycol monomethyl ether</td>
<td>125.0</td>
<td>100</td>
<td>16.7</td>
</tr>
</tbody>
</table>

³ Decomposition can occur liberating hydrogen; ensure ventilation.
⁵ Caution: can react violently at higher temperatures.

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Note: The data contained in this publication are based on our current knowledge and experience. Because many factors may affect processing or application/use, we recommend that you make tests to determine the suitability of a product for your particular purpose prior to use. It is the responsibility of the recipient of our products to ensure that any proprietary rights and existing laws and legislation are observed.
Hydrifin—products

Hydrifin Sodium borohydride is an effective and selective reducing agent used in the manufacture of pharmaceuticals and fine chemicals.

**Hydrifin P (powder)**
- sodium borohydride min. 98,0 %
- particle size 0,01-0,1 mm

**Hydrifin GS (semigranular)**
- sodium borohydride min. 98,0 %
- particle size 0,1-1,0 mm

**Hydrifin G (granular)**
- sodium borohydride min. 98,0 %
- particle size 1,0-3,0 mm

**Hydrifin T (tablets)**
- sodium borohydride min. 98,0 %
- tablet diameter 20 mm

**Hydrifin L (solution)**
- sodium borohydride 12,0 %
- sodium hydroxide 40,0 %
- water 48,0 %

**Hydrifin C (concentrate)**
- sodium borohydride 20,0 %
- sodium hydroxide 20,0 %
- water 60,0 %

**Hydrifin STAB**
- sodium triacetoxyborohydride min. 95,0 %

**Hydrifin KBH**
- potassium borohydride min. 98,0 %