



# Product Safety Summary

## Product Name: Sodium Bicarbonate

### Synopsis

**Sodium bicarbonate** is an inorganic, white crystalline powder with the formula  $\text{NaHCO}_3$  that is used as an ingredient in foods, drugs, animal feeds, cosmetics, and a wide variety of household consumer products such as soaps and detergents, cleaners, deodorizers and cat litter. It is categorized as a Generally Recognized As Safe (GRAS) direct food additive by the U.S. Food and Drug Administration. It is also used as a principal component of abrasive blast media, in water quality management and in pollution control (to treat acid flue-gas). There is an extensive volume of published literature on the human and environmental effects of sodium bicarbonate. It does not exhibit toxic effects in humans or the environment except for exposures involving very large doses. It can cause mild but reversible skin and eye irritation, primarily due to abrasive (mechanical) action, and high concentrations of sodium bicarbonate dust can irritate the respiratory tract if inhaled. Overall, toxicity effects with sodium bicarbonate have occurred only at very high or constant exposures, none of which would be expected from normal public, workplace or environmental exposure to the material.

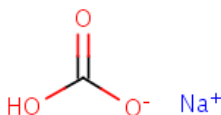
### Product Identification & Structure

Sodium Bicarbonate

$\text{NaHCO}_3$

CAS No. 144-55-8

EINECS No. 205-633-8



### Synonyms

Baking soda

Bicarbonate of soda

Carbonic acid, monosodium salt

Sodium acid carbonate

Sodium hydrogen carbonate

### Uses and Benefits

**Sodium bicarbonate** is used for cleaning, deodorizing, buffering, neutralizing and leavening, among other applications, based on its mild abrasiveness, a slightly basic pH, its ability to react with acids and bases, and its animal, human and environmental safety profile. When its broad-based efficacy is coupled with its price-value relationship, safety and low environmental impact, it plays an important role in home, professional and commercial product applications.

### Manufacture

**Sodium bicarbonate** is manufactured by bubbling carbon dioxide through a saturated soda ash solution to precipitate out bicarbonate crystals. The solution is centrifuged and the crystals dried and screened to form various grades of sodium bicarbonate based on particle size.



# Product Safety Summary

## Physical and Chemical Properties

Typical properties are as follows:

Color, Odor and Appearance	White, odorless crystalline powder
Physical State	Solid
Chemical Classification	Inorganic compound
Bulk Density	62 lbs./ft <sup>3</sup>
pH (1% solution wt./vol.)	8.2
Melting Point	50°C (begins to decompose to CO <sub>2</sub> and Na <sub>2</sub> CO <sub>3</sub> )
Solubility in Water	8.6 g/100 ml @ 20°C
Flammability	Non-flammable

## Health Effects

Based on published studies of its effects in animals and humans, **sodium bicarbonate** exhibits no toxic effects on reproduction or development, and it does not damage cells or cause cancer. Its only significant effect is that of a general increase in excess base (bicarbonate) in body fluids that increases body tissue pH above normal levels. Little documented toxicity has occurred due to the ingestion of sodium bicarbonate. Ingesting a small amount (e.g., a tablespoonful) is not likely to cause significant effects or injury as long as the stomach is not overly full; the risks of ingesting large amounts, as well as constant consumption, include gastrointestinal irritation, nausea, vomiting, diarrhea, increase in body fluid pH, hypertension and possible injury to the digestive tract. Under conditions of normal use and exposure, the primary health risks involve minimal skin and eye irritation typically due to mechanical action, and mild respiratory irritation from heavy exposure to airborne sodium bicarbonate dust. These types of exposures to sodium bicarbonate are not common when used as an ingredient in consumer products when consumers follow the product use instructions, cautions and protective measures on the product label. In the workplace, adherence to good industrial hygiene practices will prevent exposure to sodium bicarbonate at levels that may result in adverse effects.

## Environmental Effects

**Sodium bicarbonate** exists in nature as the mineral nahcolite. Studies in aquatic organisms showed that toxic effects occurred only at very high exposure levels (5 to 40 times the exposure level considered to be practically non-toxic by the US EPA). Studies on algae and a variety of plants indicate that, in general, sodium bicarbonate has no significant toxic effects on plant life under normal conditions of use and exposure (seed germination may be sensitive to sodium bicarbonate concentration). The data also suggest that some plant species may be more sensitive



# Product Safety Summary

than others. In a life cycle analysis of sodium bicarbonate, the most significant impact was related to the release of carbon dioxide from the manufacture and use of the material. It was concluded that, "...on the whole, sodium bicarbonate is benign environmentally." In laboratory experiments and actual use conditions, sodium bicarbonate has been shown to enhance sewage treatment by optimizing pH and increasing the anaerobic digestion of solids.

## Exposure

Industrial/workplace exposure to **sodium bicarbonate** can occur during research and development activities, at a manufacturing facility during production and packaging operations, when handling products (bulk sodium bicarbonate or packaged goods that contain sodium bicarbonate as an ingredient) at storage and distribution locations, while loading or unloading products and during transportation of products. In all cases, persons subject to high levels of exposure should wear proper personal protective equipment (PPE) as indicated on the product's Material Safety Data Sheet and follow good industrial hygiene practices to prevent or minimize exposure.

Consumer use of sodium bicarbonate (as pure baking soda), or household and personal care products that contain sodium bicarbonate, typically does not result in high levels of exposure or risk as long as consumers use these products in accordance with label directions and heed any cautionary information on the labels.

Environmental exposure to sodium bicarbonate can occur as a result of spills, discharges and consumer disposal of products. While sodium bicarbonate is not significantly toxic to the environment, it is always good practice to contain and collect spills for proper disposal and prevent significant discharges from entering the environment. See the product MSDS for additional information on accidental releases, disposal and use of PPE.

## See the Material Safety Data Sheet for the following information:

- Precautionary Measures
- First Aid Measures
- Fire Fighting Measures
- Accidental Release Measures
- Disposal Considerations
- Handling and Storage
- Regulatory Information



# Product Safety Summary

## Conclusion

**Sodium bicarbonate** is an extremely well-known and widely used material that historically has been used for a wide variety of applications including its use in foods, cosmetics, drugs, medical treatments, animal feeds, household consumer products and a number of environmental applications. There have been extensive investigations into the potential biological and environmental effects of sodium bicarbonate. Although toxicity from sodium bicarbonate is known to occur, the exposures that are required to cause such effects are high. Sodium bicarbonate has minimal risk from short-term over-exposure beyond mild irritation to skin, eyes and the respiratory tract. It is practically non-toxic via the oral and dermal routes, it is not a carcinogen, and it has no toxic effects on reproduction and development. Its effect on aquatic species is benign even at relatively high concentrations. In general, it is not toxic to plants. It has been found to have beneficial environmental effects when used for sewage treatment, acidified water treatment and for treatment of acid gas pollutants from smokestacks. The evidence support the conclusion that sodium bicarbonate is safe for a wide variety of consumer and specialty product applications, including its use in foods, drugs, cosmetics, cleaners, deodorizers, cat litter, animal feeds, water purification and environmental pollution control.

## Date of Summary and Contact Information

**Please contact Church & Dwight with any questions or for data references:**

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