

# Sodium bicarbonate

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Sodium bicarbonate	
General	
<a href="#">Systematic name</a>	sodium hydrogencarbonate
Other names	Sodium bicarbonate Bicarbonate of soda Baking soda
<a href="#">Molecular formula</a>	NaHCO <sub>3</sub>
<a href="#">Molecular mass</a>	84.007 g/mol
<a href="#">Exact Mass</a>	83.982
Appearance	White crystalline solid.
<a href="#">CAS number</a>	[ <a href="#">144-55-8</a> ]
Properties	
<a href="#">Density</a> and <a href="#">phase</a>	2.159 g/cm <sup>3</sup> , solid.
<a href="#">Solubility</a> in <a href="#">water</a>	7.8g/100ml water @ 18C (64F)
Other solvents e.g. <a href="#">ethanol</a>	"slightly"
<a href="#">Melting point</a>	Decomposes below MP
<a href="#">Boiling point</a>	Unknown > Decomposes

<a href="#">Acidity</a> ( $pK_a$ )	6.3
<b>Structure</b>	
<a href="#">Molecular shape</a>	?
<a href="#">Coordination geometry</a>	?
<a href="#">Crystal structure</a>	?
<b>Hazards</b>	
<a href="#">MSDS</a>	<a href="#">External MSDS</a>
Main <a href="#">hazards</a>	Irritant, esp. to respiratory system
<a href="#">NFPA 704</a>	0 1 0
<a href="#">Flash point</a>	Non-flammable.
<a href="#">R/S statement</a>	<a href="#">R</a> : ? <a href="#">S</a> : ?
<a href="#">RTECS</a> number	VZ0950000
<b><a href="#">Supplementary data page</a></b>	
<a href="#">Structure and properties</a>	$n = 1.500$
<a href="#">Thermodynamic data</a>	Phase behaviour Solid

<a href="#">Spectral data</a>	<a href="#">UV</a> , <a href="#">IR</a> , <a href="#">NMR</a> , <a href="#">MS</a>
<b>Related compounds</b>	
Other <a href="#">anions</a>	<a href="#">Sodium carbonate</a> , <a href="#">carbonic acid</a>
Other <a href="#">cations</a>	?
Related compounds	<a href="#">Sodium hydrogen sulphate</a> <a href="#">sodium hydrogen phosphate</a>
Except where noted otherwise, data are given for materials in their <a href="#">standard state (at 25°C, 100 kPa)</a> <a href="#">Infobox disclaimer and references</a>	

**Sodium bicarbonate** is the [chemical compound](#) with the formula  $\text{NaHCO}_3$ . Because it has long been known and is widely used, the [salt](#) has many other names including **sodium hydrogencarbonate**, **sodium bicarb**, **baking soda**, **bread soda**, **cooking soda**, **bicarb soda**, **saleratus** or **bicarbonate of soda**. It is [soluble](#) in water. Sodium bicarbonate is a white solid that is [crystalline](#) but often appears as a fine powder. It has a slight [alkaline](#) taste resembling that of [sodium carbonate](#). It is a component of the mineral [natron](#) and is found dissolved in many [mineral springs](#). The natural mineral form is known as **nahcolite**. It is also produced artificially.

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## [\[edit\]](#) Production

*Main article: [Solvay process](#)*

NaHCO<sub>3</sub> is mainly prepared by the [Solvay process](#), which entails the reaction of [sodium chloride](#), [ammonia](#), and [carbon dioxide](#) in water. It is produced on the scale of about 100,000 ton/year (year: 2001).<sup>[1]</sup>

Commercial quantities of baking soda are also produced by this method: soda ash, mined in the form of the ore [trona](#), is dissolved in water and treated with carbon dioxide. Sodium bicarbonate precipitates as a solid from this method:



## [\[edit\]](#) Chemistry

### [\[edit\]](#) Acid-base reactions

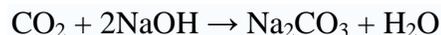
NaHCO<sub>3</sub> is a salt which consists of the ions Na<sup>+</sup> and the bicarbonate [anion](#), HCO<sub>3</sub><sup>−</sup>. It has a pK<sub>a</sub> of 6.3 in water which causes aqueous solutions to be mildly [alkaline](#):



### [\[edit\]](#) Reaction of sodium hydroxide with carbon dioxide

NaHCO<sub>3</sub> may be obtained by the reaction of [carbon dioxide](#) with an aqueous solution of [sodium hydroxide](#) :

The initial reaction produces sodium carbonate:

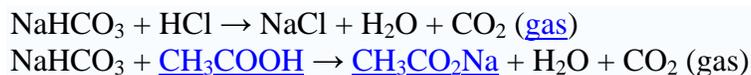


Further addition of [carbon dioxide](#) produces sodium bicarbonate, which at sufficiently high concentration will precipitate out of solution:



## [\[edit\]](#) Decomposition

Treatment of sodium bicarbonate with [acids](#), releases [carbon dioxide](#) and [water](#):



## [\[edit\]](#) Thermal decomposition

Above 60 °C, it gradually decomposes into [sodium carbonate](#), [water](#) and [carbon dioxide](#). The conversion is fast at 200 °C:



Most bicarbonates und-

## [\[edit\]](#) History

The word *saleratus*, from [Latin](#) *sal æratus* meaning "aerated [salt](#)", was widely used in the 19th century for both sodium bicarbonate and [potassium bicarbonate](#). The term has now fallen out of common usage.

## [\[edit\]](#) Applications

### [\[edit\]](#) Cooking

*Main article: [leavening agent](#)*

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Sodium bicarbonate is primarily used in [cooking](#) ([baking](#)) where it reacts with other components to release carbon dioxide, that helps [dough](#) "rise." The acidic compounds that induce this reaction include [cream of tartar](#), lemon juice, [yogurt](#), etc. Some forms of [baking powder](#) contain sodium bicarbonate combined with cream of tartar.

- A small amount can be added to a beef stew to make tough meat tenderize faster.
- Was formerly used as a source of carbon dioxide for [soda water](#).
- Can be used when preparing tomato sauce to neutralize the tomato's acidity.
- It is added to beans in water to prevent [flatulence](#) produced by digesting them.
- It is effective in extinguishing grease fires which may occur when deep frying.
- In Thailand, soaking insects in baking soda for three to five hours prior to cooking produces a sweeter, more mushroom-like taste in the finished cuisine. <sup>[citation needed](#)</sup>

## [\[edit\]](#) For neutralization of acids

The reaction of acids with sodium bicarbonate is a common method for neutralizing acid spills. The advantage to this method is that one can use excess sodium carbonate, which is relatively innocuous. The neutralization process is signaled by the release of gaseous CO<sub>2</sub>. A wide variety of applications follow from its neutralization properties including ameliorating the effects of [white phosphorus](#) in incendiary bullets, from spreading inside a soldier's afflicted wounds. [Military Application](#)

- It is commonly used to increase the pH and total alkalinity of the water for pools and spas. Sodium bicarbonate can be added as a simple solution for restoring the pH balance of water that has a high level of chlorine.
- It is sometimes used in septic tanks to control [pH](#) and bacteria.
- It neutralizes acids, i.e. sulfuric acid (H<sub>2</sub>SO<sub>4</sub>):



## [\[edit\]](#) Miscellaneous and domestic uses

Baking soda has many uses. [\[1\]](#)

### [\[edit\]](#) As a deodorizer

- An absorbent for [moisture](#) and [odors](#) e.g; an open box can be left in a [refrigerator](#) for this purpose. However, according to [one source](#), baking soda does not actually absorb odors well when used in a refrigerator.
- To help relieve itching due to bacterial infections

### [\[edit\]](#) Medical uses

- It is used as an [antacid](#) to treat [acid indigestion](#) and [heartburn](#).
- Mixed with water and drunk, it can relieve [cystitis](#).
- Mixed with water in a 10% solution can soften [earwax](#) for removal.
- In [paramedicine](#), sodium bicarbonate 7.9% is administered intravenously for cases of acidosis and overdoses of acidic toxic substances, such as tricyclic antidepressants and aspirin.
- Adverse reactions to emergency administration include congestive heart failure, with edema secondary to sodium overload, and the metabolic complication of hyperosmolarity, metabolic acidosis, and hypernatremia.
- Aids in itch relief from poison ivy rashes.
- Added to a bath or made into a paste it can be used to relieve the itching caused by chicken pox.
- For local injections of anesthetics subdermally or subcutaneously, it may be added to lessen the burning sensation of the anesthetic to the patient. For example. 9 milliliters of lidocaine mixed with 1 milliliter of sodium bicarb in a 10 cc syringe

will greatly lessen the feeling of burning, pressure and overall pain from the injection.

- Relieves [mosquito](#) bites and [bee stings](#) (but not wasp stings).

### [\[edit\]](#) Cosmetic uses

- It is marketed as a whitener because of its abrasive properties in some toothpaste brands.

### [\[edit\]](#) As a cleaning agent

- A paste from baking soda can be very effective when used in cleaning and scrubbing.
- A solution in warm water will remove the [tarnish](#) from [silver](#) when the silver is in contact with a piece of [aluminum foil](#)<sup>[2]</sup>.
- With water, it cleans the impurities on contact lenses. Rinse completely before wearing contacts to avoid stinging residue.
- Cleans brushes and combs to prevent residues.
- Use to clean juice, wine, and coffee stains.
- Pouring 1 cup of baking soda down a drain and following with 1/2 gallon of vinegar will degrease the drain.

### [\[edit\]](#) Other uses

- It is used as a fabric softener in laundry.
- It is used to test garden soil for acidity. If it bubbles, the soil is too acidic.
- Sodium bicarbonate has been used as a performance enhancer for [sprinters](#), by countering build up of lactate through induced [metabolic alkalosis](#).<sup>[citation needed]</sup>
- If mixed with super glue, it makes a suitable filling for cracks in walls.
- Baking soda can be used as a low-cost alternative to raise [pH](#) in [swimming pools](#).<sup>[3]</sup>
- Combined with [cocaine](#) to make [crack cocaine](#).
- As a desiccant, sprinkle on wet pages of books and then put them out to dry under the sun.
- Sodium bicarbonate is used in BC Dry Chemical fire extinguishers as an alternative to the corrosive ammonium phosphate in ABC extinguishers. The alkali nature of Sodium Bicarbonate makes it the only dry powder, excluding [Purple-K](#), agent allowed for use on commercial deep fat fryers, the agent forms a crust over the surface similar to the effects of a wet chemical.
- Sodium bicarbonate is often used in the pharmaceutical industry as an additive to cell culture media. It acts as a weak buffer.
- It is also used in a process for cleaning paint called [sodablasting](#).

### [\[edit\]](#) Safety

Sodium bicarbonate is considered to be relatively safe, however consumption of large amounts should be avoided. See [MSDS](#).

## [\[edit\]](#) References

1. <sup>^</sup> Holleman, A. F.; Wiberg, E. "Inorganic Chemistry" Academic Press: San Diego, 2001. ISBN 0-12-352651-5.

## [\[edit\]](#) Further reading

1. Bishop, D., J. Edge, C. Davis, and C. Goodman. Induced Metabolic Alkalosis Affects Muscle Metabolism and Muscle Metabolism and Repeated-Sprint Ability. Medicine and Science in Sports Exercise, Vol. 36, No. 5, pp. 807-813, 2004.

## [\[edit\]](#) See also

- [Baking powder](#)
- [Natron](#)
- [List of minerals](#)
- [Sodium carbonate](#)
- [Carbonic acid](#)

[Wikibooks Cookbook](#) has an article on [\*Baking soda\*](#)

## [\[edit\]](#) External links

- [Material Safety Data Sheet](#)
- [Free to read Baking Soda Book](#)
- [How Baking Soda Works \(howstuffworks.com\)](#)

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