

Calcium carbonate

From Wikipedia, the free encyclopedia

Calcium carbonate is a chemical compound with the chemical formula CaCO_3 . It is a common substance found in rock in all parts of the world, and is the main component of shells of marine organisms, snails, pearls, and eggshells. Calcium carbonate is the active ingredient in agricultural lime, and is usually the principal cause of hard water. It is commonly used medicinally as a calcium supplement or as an antacid, but excessive consumption can be hazardous.

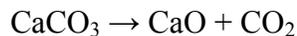
Chemical properties

Calcium carbonate shares the typical properties of other carbonates. Notably:

- it reacts with strong acids, releasing carbon dioxide:



- it releases carbon dioxide on heating (to above 840 °C in the case of CaCO_3), to form calcium oxide, commonly called quicklime, with reaction enthalpy 178 kJ / mole:

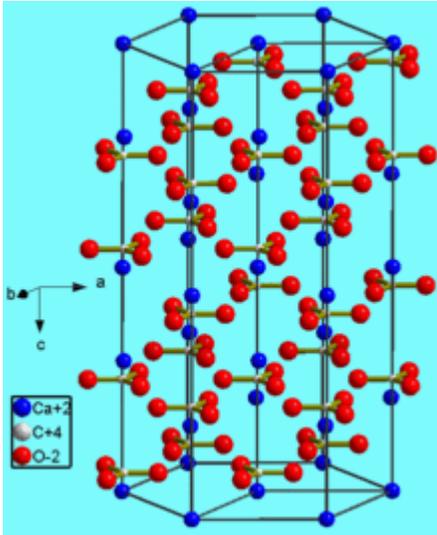


Calcium carbonate will react with water that is saturated with carbon dioxide to form the soluble calcium bicarbonate.



This reaction is important in the erosion of carbonate rocks, forming caverns, and leads to hard water in many regions.





Crystal structure of calcite

Health and dietary applications



 500 milligram calcium supplements made from calcium carbonate

Calcium carbonate is widely used medicinally as an inexpensive dietary calcium supplement or gastric antacid.^[7] It may be used as a phosphate binder for the treatment of hyperphosphatemia (primarily in patients with chronic renal failure). It is also used in the pharmaceutical industry as an inert filler for tablets and other pharmaceuticals.^[8]

Calcium carbonate is known among IBS sufferers to help reduce diarrhea. Some individuals report being symptom-free since starting supplementation. The process in which calcium carbonate reduces diarrhea is by binding water in the bowel, which creates a stool that is firmer and better formed. Calcium carbonate supplements are often combined with magnesium in various proportions. This should be taken into account as magnesium is known to cause diarrhea^[9].

Calcium carbonate is used in the production of toothpaste and has seen a resurgence as a food preservative and color retainer, when used in or with products such as organic apples or food^[10].

Excess calcium from supplements, fortified food and high-calcium diets, can cause the "milk alkali syndrome," which has serious toxicity and can be fatal. In 1915, Bertram Sippy introduced the "Sippy regimen" of hourly ingestion of milk and cream, and the gradual addition of eggs and cooked cereal, for 10 days, combined with alkaline powders, which provided symptomatic relief for peptic ulcer disease. Over the next several decades, the Sippy regimen resulted in renal failure, alkalosis, and hypercalcemia, mostly in men with peptic ulcer disease. These adverse effects were reversed when the regimen stopped, but it was fatal in some patients with protracted vomiting. Milk alkali syndrome declined in men after effective treatments for peptic ulcer disease arose. During the past 15 years, it has been reported in women taking calcium supplements above the recommended range of 1.2 to 1.5 g daily, for prevention and treatment of osteoporosis, and is exacerbated by dehydration. Calcium has been added to over-the-counter products, which contributes to inadvertent excessive intake. Excessive calcium intake can lead to hypercalcemia, complications of which include vomiting, abdominal pain and altered mental status.^[11]

As a food additive it is designated E170.^[12] It is used in some soy milk products as a source of dietary calcium; one study suggests that calcium carbonate might be as bioavailable as the calcium in cow's milk.^[13] Calcium carbonate is also used as a firming agent in many canned or bottled vegetable products.