Magnesium hydroxide

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Magnesium hydroxide is an inorganic compound with the chemical formula $Mg(OH)_2$. As a suspension in water, it is often called **milk of magnesia** because of its milk-like appearance. The solid mineral form of magnesium hydroxide is known as brucite.

Magnesium hydroxide is a common component of antacids and laxatives; it interferes with the absorption of folic acid and iron.[2] Magnesium hydroxide has low solubility in water, with a K_{sp} of 1.5×10^{-11}; all of magnesium hydroxide that does dissolve does dissociate. Since the dissociation of this small amount of dissolved magnesium hydroxide is complete, magnesium hydroxide is considered a strong electrolyte. Its low solubility makes it a weak base.

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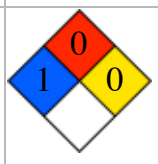
History

In 1829, Sir James Murray used a fluid magnesia preparation of his own design to treat the Lord Lieutenant of Ireland, the Marquis of Anglesey. This was so successful (advertised in Australia and approved by the Royal College of Surgeons in 1838)[3] that he was appointed resident physician to Anglesey and two subsequent Lords Lieutenants, and knighted. His fluid magnesia product was patented two years after his death in 1873.[4]

The term *milk of magnesia* was first used for a white-colored, aqueous, mildly alkaline suspension of magnesium hydroxide formulated at about 8%w/v by Charles Henry Phillips in 1880 and sold under the brand name *Phillips' Milk of Magnesia* for medicinal

Magnesium hydroxide	
	
IUPAC name	
Magnesium hydroxide	
Other names	
Milk of Magnesia	
Identifiers	
CAS number	1309-42-8 ✓
PubChem	14791
RTECS number	OM3570000
Properties	
Molecular formula	$Mg(OH)_2$
Molar mass	58.3197 g/mol
Appearance	White solid
Density	2.3446 g/cm^3
Melting point	350 °C (decomp.)
Solubility in water	1.2 mg/100 mL
Solubility product, K_{sp}	1.5×10^{-11}
Refractive index (n_D)	1.559[1]
Thermochemistry	
Std enthalpy of formation $\Delta_f H^\circ_{298}$	–925 kJ/mol
Standard molar entropy S°_{298}	63 J K^{-1} mol^{-1}
Hazards	
MSDS	External MSDS (https://fscimage.fishersci.com/msds/13405.htm)
EU Index	Not listed
NFPA 704	
Flash point	Non-flammable
Related compounds	
Other anions	Magnesium oxide

usage.

Although the name may at some point have been owned by GlaxoSmithKline, USPTO registrations show "Milk of Magnesia" to be registered to Bayer,[5] and "Phillips' Milk of Magnesia" to Sterling Drug.[6] In the UK, the non-brand (generic) name of "Milk of Magnesia" and "Phillips' Milk of Magnesia" is "Cream of Magnesia" (Magnesium Hydroxide Mixture, BP).

Other cations	Beryllium hydroxide Calcium hydroxide Strontium hydroxide Barium hydroxide
✓ (what is this?) (verify) (http://en.wikipedia.org/w/index.php?title=Magnesium_hydroxide&diff=cur&oldid=265527430) Except where noted otherwise, data are given for materials in their standard state (at 25 °C, 100 kPa)	
Infobox references	

Preparation

Magnesium hydroxide can be precipitated by the metathesis reaction between magnesium salts and sodium, potassium, or ammonium hydroxide:

$$Mg^{2+}(aq) + 2\ OH^{-}(aq) \rightarrow Mg(OH)_2(s)$$

Uses

Suspensions of magnesium hydroxide in water (milk of magnesia) are used as an antacid to neutralize stomach acid, and a laxative. The diarrhea caused by magnesium hydroxide carries away much of the body's supply of potassium, and failure to take extra potassium may lead to muscle cramps.[7] Magnesium hydroxide is also used as an antiperspirant armpit deodorant.[8] Milk of magnesia is useful against canker sores (aphthous ulcer) when used topically.[9]

Milk of magnesia is sold for medical use as chewable tablets, capsules, and as liquids having various added flavors. It is primarily used to alleviate constipation, but also to relieve indigestion and heartburn. When taken orally as a laxative, the osmotic force of the magnesia suspension acts to draw fluids from the body and to retain those already within the lumen of the intestine, serving to distend the bowel, thus stimulating nerves within the colon wall, inducing peristalsis and resulting in evacuation of colonic contents. It is also used as an antacid, though more modern formulations combine the antimotility effects of equal concentrations of aluminum hydroxide to avoid unwanted laxative effects.

Milk of magnesia is also used as a folk remedy, applied and massaged in (a few minutes before washing), to relieve symptoms of seborrhea and dandruff. The mechanism for its effectiveness in this application, like the causes of seborrhea itself, are unknown. An additional folk use is for the treatment of acne or oily skin by applying topically, allowing to dry, and then washing it off the face (or other body part). It is also said to be used for seborrheic dermatitis, which is a drying and flaking of the skin similar to dandruff but often occurring on the face.[10]

Magnesium hydroxide powder is used industrially as a non-hazardous alkali to neutralise acidic wastewaters.[11] It also takes part in the Biorock method of building artificial reefs.

Solid magnesium hydroxide has also smoke suppressing and fire retarding properties. This is due to the endothermic decomposition it undergoes at 332 °C (630 °F) :

$$Mg(OH)_2 \rightarrow MgO + H_2O$$

The heat absorbed by the reaction acts as a retardant by delaying ignition of the associated substance. The water released dilutes any combustible gases and inhibits oxygen from aiding the combustion. Common

uses of magnesium hydroxide as a fire retardant include plastics, roofing, and coatings. Another mineral that is used in similar fire retardant applications is hydromagnesite.

Biological metabolism

When the patient drinks the milk of magnesia, the suspension enters the stomach. Depending on how much was taken, one of two possible outcomes will occur.

As an antacid, milk of magnesia is dosed at approximately 0.5–1.5g in adults and works by simple neutralization, where the hydroxide ions from the $Mg(OH)_2$ combine with acidic H^+ ions produced in the form of hydrochloric acid by parietal cells in the stomach to produce water.

As a laxative, milk of magnesia is dosed at 2–5 g, and works in a number of ways. First, Mg^{2+} is poorly absorbed from the intestinal tract, so it draws water from the surrounding tissue by osmosis. Not only does this increase in water content soften the feces, it also increases the volume of feces in the intestine (intraluminal volume) which naturally stimulates intestinal motility. Furthermore, Mg^{2+} ions cause the release of CCK, which results in intraluminal accumulation of water, electrolytes, and increased intestinal motility. Although it has been stated in some sources, the hydroxide ions themselves do not play a significant role in the laxative effects of milk of magnesia, as basic solutions (i.e. solutions of hydroxide ions) are not strongly laxative, and non-basic Mg^{2+} solutions, like $MgSO_4$, are equally strong laxatives mole for mole.[12]

Only a small amount of the magnesium from milk of magnesia is usually absorbed from a person's intestine (unless the person is deficient in magnesium). However, magnesium is mainly excreted by the kidneys so longterm, daily consumption of milk of magnesia by someone suffering from renal failure could lead in theory to hypermagnesemia.

As with any other medication, some people may have adverse reactions to milk of magnesia. These can include weakness, nausea, vomiting, and diarrhea. High doses increase the likelihood of these reactions. Patients with severe chronic kidney disease are advised to avoid overconsumption of milk of magnesia. Because the kidney functions to excrete magnesium, taking too much would wear out the kidney and lead to toxic levels of magnesium in the blood. Healthy individuals should not use this type of medication continuously for longer than one week, or an excessively harsh laxative effect may result.

References

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