Disposal of calcium oxide

Posted by Anonymous on Fri, 2016-03-11 12:31

Calcium oxide disposal: Hi. Can anyone tell me how to dispose of some very old calcium oxide. The container is all swollen and the date on the bottle is Dec 1988.

CSIS says it can be disposed of to landfill, I was just wondering if someone can confirm if that's correct.

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Calcium oxide disposal

Submitted by on 30 March 2016

Answer reviewed 27 February 2023

From your provided information, its sounds like you have a fairly large quantity of waste calcium oxide and its degradation products, calcium hydroxide and calcium carbonate. This quantity would be cumbersome to treat and dispose of on-site, and therefore, we recommend that you store the bottle and arrange for its collection by a licenced waste disposal contractor. We have been advised1 that, as waste calcium oxide poses a corrosive hazard, it should be collected for disposal, rather than disposed of to landfill. For small quantities of calcium oxide waste, we believe that its treatment and disposal could be easily managed at your school site.

Small quantities: treatment and disposal

Wear PPE (safety glasses, closed-in shoes, lab coat, nitrile gloves) and carry out the work in a fume cupboard.

1. **Use as a soil conditioner:** We recommend slowly adding and mixing the calcium oxide waste into a large container of water, for example, a bucket. This will ensure that any remaining calcium oxide will react with the water and be converted to calcium hydroxide, commonly called slaked lime. Add it slowly as the chemical reaction of calcium oxide and water is exothermic. Calcium hydroxide is not very soluble in water, so this will form a white slurry. The slurry will also include some calcium carbonate that has resulted from the reaction over time of the calcium oxide with atmospheric carbon dioxide.

The resultant material can be applied as garden lime at a suitable dose rate. Slaked lime is commonly used as a pH adjuster for acidic soils.

1. **Dispose of as a neutral solution:**2 Slowly add the waste calcium oxide to a large volume of water at the rate of about 5 g of calcium oxide to 100 mL of water (approximately 5%). As noted in **1** above, the calcium oxide should be added slowly because the reaction is exothermic. This will form a slurry of calcium hydroxide/calcium carbonate. Slowly, and with stirring, add dilute hydrochloric acid (1–2 M) until a near-neutral pH is attained (pH 6–8). The pH can be tested with pH paper, Universal Indicator solution or a pH probe. Wash the solution down the sink with further dilution. Hydrogen chloride neutralises the calcium hydroxide according to the equation:

$Ca(OH)_2 + 2HCl \rightarrow CaCl_2 + 2H_2O$

Additional information

Calcium oxide, also known as “quick” or “burnt” lime, has traditionally been manufactured through a “lime burning” process of heating limestone (calcium carbonate) in kilns to decompose it into calcium oxide and carbon dioxide.

$CaCO_3 \rightarrow CaO + CO_2$

Calcium oxide has a limited shelf life as it reacts readily with both the moisture and the carbon dioxide in the air, forming calcium hydroxide and calcium carbonate respectively. Its rate of degradation depends on factors such as its exposure to air, and the temperature and humidity. The date of your container (1988) and the fact that it is very swollen would indicate that these reactions are well advanced, and that much of your original calcium oxide will by now have been converted to calcium hydroxide and calcium carbonate.

$CaO + H_2O \rightarrow Ca(OH)_2$

$CaO + CO_2 \rightarrow CaCO_3$

Calcium oxide is corrosive and can cause severe skin burns and eye damage. Calcium hydroxide is corrosive and can cause serious eye damage and respiratory and skin irritation. Calcium carbonate is not a classified as hazardous.

References

[1] Assistance from ChemCentre, Curtin University of Technology, Bentley WA, March 24, 2016.

[2] Armour, M. 2003. *Hazardous Laboratory Chemicals Disposal Guide*, Third Edition, CRC Press: New York, p 123.

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