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potassium permanganate

Posted by Anonymous on Mon, 2015-05-04 16:48

Potassium permanganate: I would like to know how to dispose of potassium permanganate 0.02M solution. The MSDS states it is not a hazard but that it must not be put down the drain.

The MSDS for potassium permanganate 0.02M states:

2. HAZARDS IDENTIFICATION 2.1 GHS Classification: Not a dangerous substance or mixture according to the Globally Harmonised System (GHS).

6.2 Environmental precautions: Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

13. DISPOSAL CONSIDERATIONS 13.1 Waste treatment methods: Product Offer surplus and non-recyclable solutions to a licensed disposal company.

Voting:



No votes yet

Laboratory Technicians:

Laboratory Technicians

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Submitted by sat on 25 May 2015

In response to the following comment:

Just to clarify, the response says the solution can be stored for future use and to take care as it can deteriorate. If you are not sure of the molarity of the solution, is it worthwhile holding onto? Secondly, if the solution deteriorates, how long will it be viable and when it does deteriorate does it still need to be collected by a licensed contractor?

Dealing with each question separately:

Q1. If you are not sure of the molarity of the solution, is it worthwhile holding onto?

Molarity can be established by titrating with oxalic acid. Please follow the steps for the student activity "standardising potassium permanganate solution" in the student experiment manual. (If the solution has visibly deteriorated, that is, there is a change in colour or if visible particles/suspensions present etc. it is not suitable for use and not worthwhile attempting above step.)

Once the molarity is established, you may decide to calculate and adjust it as per your need. However, if the solution has been stored for a long time and/or if you have added more potassium permanganate solids to an existing solution to adjust molarity, it is recommended to boil the solution for 10 minutes, as you do when making it fresh, and then filter the solution through glass wool to remove any MnO_2 , which would catalyse the decomposition of the MnO_4^- ion; and store them in dark bottles, wrapped in Al foil away from light.

Therefore, it is worthwhile to store surplus potassium permanganate solutions for future use.

Q2. Secondly, if the solution deteriorates, how long will it be viable and when it does deteriorate does it still need to be collected by a licensed contractor?

It is not possible to state an exact shelf life for this type of solution. Many schools use one-year-old solutions most of the time, not even needing to adjust molarity. It all depends on how you made it, and how you stored it.

Due to environmental concerns, responsible practice for waste or surplus permanganate solutions to be disposed of is through a licensed contractor. Even though partially deteriorated, it is still an oxidising agent, and Mn^{2+} ions present in solution from decomposed MnO_4^- are a threat to the aquatic environment.

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Submitted by sat on 17 May 2015

Safety Data Sheets (SDSs) are the best general source of information available for any chemical, and they should be consulted as a first step in assessing the risk associated with disposal.

Due to toxicity to the aquatic environment, potassium permanganate solution should not be allowed to enter drains or waterways. Therefore, the safe and recommended practice for disposal of this solution is through a licensed waste disposal contractor.

Alternatively, this solution can be stored for future use. Care should be taken when preparing and storing since potassium permanganate solutions are not stable and decompose when reducing agents are present. It is affected by light and is best stored in an amber glass bottle. An additional measure to exclude light is to wrap the bottle in aluminium foil.

Background information:

A dilute solution of potassium permanganate is not classified as hazardous in general. It is used as an oxidising agent, a disinfectant, as an anti-algal agent, in metal cleaning, in tanning, bleaching, and as a preservative for fresh flowers and fruits.

However, potassium permanganate is very toxic to the aquatic environment, which is why it is not suitable for being disposed of down the sink and into waterways.

Most toxicity tests have been carried out using soluble Mn(II) salts. Potassium permanganate is a highly soluble salt containing Mn(VII) ions. For example:

- For algae and protozoa, there is a wide range of toxicity values: the most sensitive species are marine diatoms and freshwater algae being affected by amounts as low as 1.5 mg manganese/litre.
- Aquatic invertebrates are affected by amounts ranging from 0.8 to 1389 mg manganese/litre.
- A significant reduction in survival and hatching of crab embryos at ≥ 0.01 mg manganese/litre in seawater was found.
- Fish are affected at levels from 2.4 to 3350 mg manganese/litre.
- Significant embryonic mortality was observed in trout eggs at 1 mg manganese sulfate/litre.
- A single embryo-larval test was identified for amphibians at 1.4 mg manganese/litre.

Read more at <http://www.inchem.org/documents/cicads/cicads/cicad63.htm#7.0> 7.2 Toxicity to the aquatic environment.

References:

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Howe, P.D, Malcolm, H.M, Dobson, S. 2004 'Manganese and its compounds: Environmental aspects' WHO: Geneva <http://www.inchem.org/documents/cicads/cicads/cicad63.htm#7.0>

'Manganese and compounds' Australian Government Department of Environment website <http://www.npi.gov.au/resource/manganese-compounds> (Accessed May 2015)

https://www.who.int/ipcs/publications/cicad/cicad63_rev_1.pdf

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