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Copper Sulfate Crystals

Posted by Anonymous on Tue, 2016-11-15 10:55

Copper Sulfate Crystals: Is there a way to re-use copper (II) sulfate crystals to make another saturated solution?

Voting:



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Laboratory Technicians:

Laboratory Technicians

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Copper Sulfate Crystals

Submitted by sat on 23 November 2016

In Brief:

Recycling and reuse of chemicals can be considered if safe and appropriate to minimise the generation of chemical waste. It is often possible for waste from one process to be used for another.

In the school science laboratory copper (II) sulfate crystals made by students can be reused to make new copper (II) sulfate solutions.

Depending on the size of the crystals you may need to crush them into smaller pieces to allow

them to easily dissolve in the solvent (water). Solutions made from recycled crystals may contain impurities if using technical grade chemicals or dust or other contaminants from the environment from the crystal making process. These impurities may be an issue and can be filtered out before use. Solutions made from recycled copper (II) sulfate crystals would not be suitable for senior analytical experiments.

Preparation of copper (II) sulfate crystals for reuse:

- Ensure the working area is well ventilated.
- Small crystals of copper (II) sulfate (less than 5mm in size) can be placed directly into deionised water and stirred to dissolve.
- Large crystals can be crushed gently in a mortar and pestle to smaller crystals to enable better dissolving. This process should be conducted in a fume cupboard. Alternately larger crystals can be allowed to dissolve in sufficient water over several hours.
- Heating the copper (II) sulfate solution can help with the dissolution. An increase in temperature will allow more copper (II) sulfate to dissolve and at a faster rate. It is relatively safe to heat the solution to a temperature around 50-60⁰C. The use of a hot plate or water bath is appropriate as long as the temperature is monitored. Take care not to inhale fumes from a heated solution, therefore this is also best conducted in a fume cupboard.
- The solubility of copper (II) sulfate pentahydrate is 317g/L water at 20⁰C¹. It is recommended that you weigh the copper (II) sulfate crystals to determine the approximate volume of water required to make a saturated solution.
- If required filter the solution to remove any undissolved solid and any impurity that may be present.

Safety:

- Copper (II) sulfate is a skin and serious eye irritant and is toxic by ingestion and inhalation. Avoid contact with eyes and skin and breathing dust.
- Wear appropriate PPE such as safety glasses and nitrile or latex gloves.
- Do not place solutions down the sink as copper (II) sulfate is toxic to aquatic life.
- Waste solutions can be evaporated to reduce the volume.
- Copper ions can be displaced with steel wool and then the solid copper can be disposed of in the regular waste.

Science ASSIST recommends a risk assessment be conducted prior to the use of any chemicals, and all appropriate control measures be identified and implemented. Science ASSIST has developed a one page risk assessment template, see [Risk Assessment Template](#)

Science ASSIST has previously answered some related questions see:

[Formation of crystals](#)

[SOP: Hazardous waste](#)

[Laboratory Chemicals and Waste Management/Setup](#)

References:

¹'Copper sulfate' Safety Data Sheet, Chem-Supply website,
<https://www.chemsupply.com.au/documents/CL0681CH2B.pdf> (March 2014)

'3.5 Solutions and crystals' Basic Science & Technology website. [3.5 Solutions and crystals - Basic Science & Technology](#) (Accessed November 2016)

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<https://www.raci.org.au/document/item/1862> (Accessed November 2016)

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