

Performing a Serial Dilution using copper sulfate

Aim: To carry out a log dilution series using copper sulfate.

Background

In this protocol, a stock solution of 100 mM copper sulfate will be provided by the school technician. The risk assessment should be consulted. This will be diluted by a factor of 10, three times. In the diagram, the left-most container is the stock 100 mM copper sulfate solution. Learners should collect 3 universals or test tubes and label them as outlined in step 2.

The benefit of using copper sulfate is that a visual assessment of dilution can also be made without the risk of working with microorganisms and their subsequent disposal. Colorimetry could be used to measure absorbance (although these values will be very small/negligible at lowest concentrations).

This protocol could also be adapted by using a suspension of yeast (e.g. 1g Baker's yeast in 50 cm³) as the stock solution and the same protocol carried out. Colorimetry could be used to measure turbidity of each suspension.

Materials:

- Universal containing 100 mM copper sulfate (stock solution; 10⁻⁰)
- 10 cm³ glass pipette and pump (or 10 cm³ measuring cylinder if pipettes unavailable)
- Distilled water
- 1 cm³ automatic pipette and tips
- 3 universal tubes
- Marker pen

Method

1. Add 9cm³ water to the 3 empty universal tubes (in the diagram, this is the 2nd, 3rd and 4th tube). For higher levels of accuracy, this should be done using a 10cm³ glass pipette with pump/bulb (if possible).
2. Label the lids with the dilution factor.
3. Using the automatic pipette, add 1 cm³ stock copper sulfate to the tube labelled 10⁻¹. Mix.
4. Add 1cm³ 10⁻¹ copper sulfate solution to the tube labelled 10⁻². Mix
5. Add 1cm³ 10⁻² copper sulfate solution to the tube labelled 10⁻³. Mix.

