The genie in the bottle

Education in Chemistry
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Technician notes

Kit

- Approx. 50 cm^3 of ethanol (importantly, not IDA/IMS), (highly flammable liquid and vapour, harmful) *(Hazcard 40A, recipe 002)*
- Boric acid (may damage fertility, may damage the unborn child) *(Hazcard 14A)*
- 2.5 – 3.0 g of the following salts:
    - lithium chloride *(Hazcard 47B)*
    - sodium chloride *(Hazcard 47B)*
    - potassium chloride *(Hazcard 47B)*
    - anhydrous calcium chloride (irritant) *(Hazcard 19A)*
    - hydrated strontium chloride *(Hazcard 19A)*
    - hydrated barium chloride (harmful, toxic) *(Hazcard 10A)*
    - hydrated copper(II) chloride (harmful, irritant, very toxic to aquatic life) *(Hazcard 27A)*
- 80 mm borosilicate crystallising dishes or 250 cm^3 borosilicate beakers
- Heat-resistant mats
- Wooden splints
- Metre rule

Preparation

Work in a well-ventilated room and wear eye protection. Place the beakers / basins on the heat-resistant mats and spread 2.5 – 3.0 g of each salt around the base of the container. Dampen the solid with approximately 0.5 cm^3 of water and add approximately 6 cm^3 ethanol over each. Stopper the ethanol bottle and remove it to at least 2 m away from the demonstration.

In front of the class

Position the audience 3 m away from the demonstration with eye protection. Ask for a volunteer to switch off the lights if the switch is not nearby. Ignite the solvent in each container with a splint on a metre rule. Each beaker will burn with a characteristic colour. Allow the flames to burn out – do not attempt to add more solvent until at least 15 minutes have passed since the last flame extinguished.

Safety and disposal

Boric acid is a teratogen – you may not wish to use it.

Do not be tempted to pour more alcohol onto the flame or hot glassware in order to extend the demonstration. Use only borosilicate glass (avoid watchglasses, which are usually made from soda glass and may crack).

Dilute the contents of the copper(II) chloride beaker to 1 L and pour down the sink. The other salts will be unchanged at the end of the demonstration and can be retrieved and recycled for future demonstrations.