Hydrated Crystals

Hydrates are compounds that incorporate water molecules in their crystalline structures. The ratio of moles of water to one mole of the compound is a small whole number. For example, in the hydrated compound copper(II) sulfate pentahydrate ($CuSO_4 \cdot 5H_2O$), the ratio is 5:1. The ratio of moles of water to one mole of a hydrate can be determined experimentally by heating the hydrate to remove water.

Problem

How can you determine the moles of water in a mole of a hydrated compound?

Objectives

- **Heat** a known mass of hydrated compound until the water is removed.
- **Calculate** the formula for a hydrate using the mass of the hydrated compound and the mass of the anhydrous compound.

Materials

Bunsen burner
ring stand and ring
crucible and lid
clay triangle
crucible tongs
balance
Epsom salts (hydrated $MgSO_4$)
spatula
spark lighter or matches

Safety Precautions

- **Always wear safety goggles and a lab apron.**
- **Hot objects will not appear to be hot.**
- **Use the Bunsen burner carefully.**
- **Turn off the Bunsen burner when not in use.**

Pre-Lab

1. Read the entire **CHEMLAB**.

2. Prepare all written materials that you will take into the laboratory. Be sure to include safety pre-cautions and procedure notes. Use the data table on the next page.

3. Explain how you will obtain the mass of water and the mass of anhydrous $MgSO_4$ contained in the hydrate.

_____

_____

_____

_____

_____

_____

4. How will you convert the masses of anhydrous $MgSO_4$ and water to moles?

_____

_____

_____

_____

_____

5. How can you obtain the formula for the hydrate from the moles of anhydrous $MgSO_4$ and the moles of water?

_____

_____

_____

_____