

Formula of a Hydrate

Purpose: To determine the mass and moles of water hydrated to a salt.
To establish for formula of a hydrated salt.

Principles:

Many salts occurring in nature or purchased from chemical suppliers are hydrated; that is, a number of water molecules are bound to the ions in the crystalline structure of the salt. The number of moles of water per mole of a particular hydrated salt is usually a constant. For example, ferric chloride is purchased as $\text{FeCl}_3 \cdot 6\text{H}_2\text{O}$, not as FeCl_3 . For some salts, heat removes these water molecules:



Where as in others, they cannot be removed, no matter how intense the heat, e.g., $\text{FeCl}_3 \cdot 6\text{H}_2\text{O}$.

Procedure:

Completion of at least 3 trials is suggested for this experiment.

1. Support a clean crucible and lid on a clay triangle and heat with an intense flame for 5 minutes. Allow it to cool. If the crucible is very dirty, add a few milliliters of 6 M HNO_3 . (CAUTION: Avoid skin contact, flush immediately with water) and evaporate to dryness. Weigh the fired crucible and lid. Handle the crucible and lid with the crucible tongs for the rest of the experiment; do not use your fingers.
2. Add at most 3 g of an unknown copper sulfate hydrate to the crucible and weigh it, the lid, and the sample.
3. Return the crucible with the sample to the clay triangle and set the lid off the crucible's edge to allow evolved gases to escape.
4. At first, heat the sample slowly and then gradually intensify the heat. Do not allow the crucible to become red-hot. This could cause the anhydrous (dried) salt to decompose. Heat the sample for 15 minutes. Cover the crucible with the lid, cool to room temperature, and weigh it, the lid, and the sample.
5. Reheat the sample for 5 minutes. Reweigh it. If the second weighing disagrees by anything over 2% with the first, repeat the heating until a constant weight is achieved.

DCP and CE criterion will be assessed.