

Determining the Percent Water In a Hydrate Salt - LAB

Honors Chemistry

Name: _____
Period: _____ Date: _____

Background Information:

Many salts that are crystallized from aqueous solutions appear to be perfectly dry, yet, when heated, they liberate large quantities of water. The crystals change form, even color, as the water is driven off. Such compounds are called **HYDRATES**. The number of moles of water present per mole of *anhydrous salt* (the compound without the water) is usually a whole number. The water is bonded to the metal atom in the compound by a special type of bond - called a *coordinate covalent* bond or *dative* bond.

In this experiment you will be asked to determine the percentage of water in a hydrate. You will determine the mass of the hydrated salt sample, drive off the water by heating, and find the mass of the anhydrous salt. By calculating the moles of water driven off and the moles of the anhydrous salt remaining, you will be able to determine the empirical formula of the hydrate.

Materials:

_____ • n H₂O hot plate evaporating dish cooling pad (or wire gauze)
scoopula crucible tongs hot hands stirring rod

Procedure:

- 1) Weigh an evaporating dish and record the mass in the data chart. **Use the same balance for all weighings.**
- 2) Measure out about **seven** grams of your hydrate in the evaporating dish and record the exact mass of the evaporating dish and hydrate. Record the chemical formula of the unknown hydrate.
- 3) Place the evaporating dish containing the hydrate on a hot plate set on medium-high. Observe.
- 4) Heat the sample approximately 5 minutes. **Make sure not to let any of the sample escape from the dish!**
- 5) Let the dish cool on the cooling pad for 3-5 minutes. When cool to the touch, find the mass of the dish and its contents.
- 6) The sample needs to be heated to a constant mass to ensure all of the water has been driven off. To do this, reheat the anhydrous salt for 5 minutes, cool it to room temp, and reweigh to make sure that all of the water has been driven off.
- 7) Repeat this heating and cooling process until the mass of the dish and contents is constant (~3 times).

Data:

Mass of empty evaporating dish		
Mass of evaporating dish and hydrate		
These should be within +/- 0.10g (1pt)	Mass of evaporating dish and anhydrous salt after 1 st heating	
	Mass of evaporating dish and anhydrous salt after 2 nd heating	
	Mass of evaporating dish and anhydrous salt after 3 rd heating	

Formula of anhydrous salt (½ pt) =

Calculations: Show calculations in the space provided - even if the calculation is as simple as subtraction! (8pts)

Mass of hydrate

Mass of anhydrous salt

Moles of anhydrous salt

Mass of water that evaporated

Moles of water that evaporated

Mole ratio of WATER to
ANHYDROUS SALT:
(round to the nearest whole number)

Formula for the hydrate =

Name for the hydrate =

