PERCENT OF WATER IN A HYDRATE

Hydrates are ionic compounds (salts) that have a definite amount of water trapped inside their crystalline structures. This "water of hydration" is released as a vapor if the hydrate is heated. The remaining solid is known as the *anhydrous* salt.

The percent of water in a hydrate can be found experimentally by accurately determining the mass of the hydrate and the mass of the anhydrous salt. The difference in mass is due to water loss. From this
information, the percent of water in the hydrate may be calculated as follows :

$$\% \ H_2O \ = \ \frac{mass \ H_2O}{mass \ hydrate} \ x \ 100$$

Problem : What percent of the mass of the unknown salt is due to water?

Hypothesis : _____

Materials :   hydrated salt
evaporating dish
ring stand and ring clamp
Bunsen burner
balance
wire gauze

Procedure :

1. Determine the mass of an empty evaporating dish.

2. Mass out approximately 3 grams of the hydrate in the evaporating dish and determine its exact mass.

3. Heat the hydrated salt gently to remove the water but avoid spattering.

4. When the water appears to have evaporated, heat more strongly for five minutes more but avoid any "browning" of the salt. Break up any caked salt crystals with a spatula while heating but be careful not to leave any solid on the spatula as you remove the spatula.

5. Allow the dehydrated salt to cool and then determine its mass.

6. Calculate the percent of water in the original hydrated salt.

Data :

mass of empty evaporating dish   _____

mass of evaporating dish plus hydrate   _____

mass of hydrate   _____

mass of evaporating dish plus anhydrous salt   _____

mass of anhydrous salt   _____

mass of water
_____

Calculations:

% of water in hydrate
_____

Summary and Conclusions:
Discuss the method used to determine the mass percent of water in a hydrated crystal. How could a similar method be used to calculate the percent of water in an average kernel of popcorn? Discuss the procedure that you would use to make a determination of the percent of water in popcorn. Discuss possible sources of error in this experiment, and in the popcorn experiment.