Determination the ratio of water of hydration in crystalied $BaCl_2.XH_2O$

Introduction

The water crystallization can be determined using sample weight change as a result of its water content ejection by heating it.

This method can be only used in the following cases:

> 1- **When water is the primary part to be volatilized only.**
> 2- **When the composition of the precipitate does not change as a result of Oxidation or hydrolysis.**

The Barium chloride salt loses all crystallized water at a temperature range from (100-120) centigrade, high temperatures can be used for this purpose considering that the salt does not break at high temperatures up to (800-900) centigrade.

$$BaCl_2.XH_2O \longrightarrow BaCl_2 + XH_2O$$

Barium dichloride crystals shows a little tendency to absorb water in the spaces of the molecules of the substance, which means that any change in weight represents a great precision water of crystallization.

Crystallization water can be determinte for each of the following salts:

$MgSO_4.7H_2O$	$Na_2B_4O_7.10H_2O$	$Na_2HPO_4.12H_2$

Materials and tools

1- Crucible.
2- Desiccator.
3- Oven & Furnace.
4- Aqueous Barium Chloride crystals $BaCl_2.XH_2O$.

Procedure

1- Heat the crucible inside the oven and then leave for a (30) minutes , cool in a desiccator for (15) minutes and then weigh after cooling.

2- Put in the crucible (0.5) gm of the sample and weigh it again (aqueous Barium Chloride $BaCl_2.XH_2O$).

3- Put the crucible inside the burning furnace for half an hour.

4- Let the crucible and its contents to be cooled in a desiccator and then weight it.

5- From weight loss after burning process, calculate the prcentage of water in aqueous Barium Chloride and Calculate the water molecule number in aqueous Barium Chloride ($BaCl_2.XH_2O$) .

Calculation

Weight of Water salt (model weight) = 0.5 g

Weight of anhydrous Salt = Weight of crucible with anhydrous Salt

(after heating)   - Weight of an empty Crucible

The weight of water = the weight of aqueous salt - the weight of anhydrous salt

$$100 \times \frac{\text{wt of } H_2O}{\text{wt of sample}} = H_2O\%$$

Calculate the number of water molecules crystallization (x)

It is extracted from the following equation:

$$\frac{M.\,wtBaCL_2.XH_2O}{M.\,wtBaCL_2} = \frac{wt\ BaCL_2.XH_2O}{wt\ BaCL_2}$$

Questions

1- What are the conditions required in a materials that water crystallization can be determinted? Give an example.
2- Why empty Crucibles need to be heated?
3- Define crystallized materials? Can some of them be used in chemical analyzes?
4- What is the purpose of the crucible cooling after heating in a desiccator?