

Determination of the Formula of a Hydrated Salt

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1 Questions

1. *What is the name of the salt (not the hydrate part)?*

The name of the salt is $CaSO_4$

2. *Calculate the percent water in the hydrated sample. Be sure to report the answer to the proper number of significant figures.*

$$\frac{0.20g}{1.00g} = 0.20 \rightarrow 20\%$$

3. *Calculate the moles of water and the moles of anhydrous compound in your sample. Calculate the number of waters of hydration in the formula from this information.*

$$\frac{0.20g}{18.02 \frac{g}{mol} H_2O} = 0.011mol$$

$$\frac{0.80g}{136.14 \frac{g}{mol} CaSO_4} = 0.0059mol$$

$$\frac{0.011mol H_2O}{0.0059mol CaSO_4} \approx 2$$

Therefore waters of hydration: 2

4. Write the complete & correct formula for the hydrated compound you started with. For examples, see the front of this sheet.

The formula for the hydrated compound is $\text{CaSO}_4 \bullet 2\text{H}_2\text{O}$.

5. What effect would heating the hydrated sample for too short a time have on the calculated percent water? Would the calculated percent water be lower or higher than the actual one? Explain your answer.

If the hydrated sample were heated for too short a time, the calculated percent water would be lower, because less water would appear to evaporate from the hydrated sample.

6. Suppose the crucible and cover were not heated to dryness after being rinsed with distilled water. Would the resulting determination of the percent water in the hydrate be lower or higher than the actual one? Explain your answer.

If the crucible were not heated to dryness after rinsing, the resulting percent water in the hydrate would be higher than the actual one, because the hydrate would have absorbed water (being a hygroscopic compound). That excess water would then be weighed along with the sample, and when the excess water is evaporated, the difference between the initial and final masses would be larger, inflating the percentage of water in the hydrate.

2 Data Table

Relative Mass of Hydrate with and without Water

Initial Mass	Hydrate Mass	Dry Hydrate Mass
11.01g	12.01g	11.81g
0.00g	1.00g	0.80g