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Mass of crucible and hydrated compound: 16.08g

Mass of crucible and anhydrous compound(first heating): 14.55g

Mass of crucible and anhydrous compound(second heating): 14.55g

Observations:

The $\text{MgSO}_4 \cdot x\text{H}_2\text{O}$ turned a more white color and seemed to melt into a single mass. It started off as clear granules(like table salt), and ended up as a single white mass. Mass went down after heating.

Analysis:

Mass of anhydrous compound: $14.55\text{g} - 13.08\text{g} = \underline{1.47\text{g MgSO}_4}$

Mass of water in hydrated compound: $3\text{g} - 1.47\text{g} = \underline{1.53\text{g H}_2\text{O}}$

Moles of anhydrous compound: $1.47\text{g} / (24.30 + 32.06 + 4 \cdot 16.00) = \underline{12.2 \cdot 10^{-3} \text{ mol MgSO}_4}$

Moles of water in hydrated compound: $1.53\text{g} / (2 \cdot 1.008 + 16.00) = \underline{84.9 \cdot 10^{-3} \text{ mol H}_2\text{O}}$

Ratio of moles of anhydrous compound to moles of water: $12.2 \cdot 10^{-3} / 84.9 \cdot 10^{-3} \text{ mol MgSO}_4 : 84.9 \cdot 10^{-3} / 12.2 \cdot 10^{-3} \text{ mol H}_2\text{O} = 1:6.959 \sim \underline{1:7 \text{ mol. MgSO}_4 \cdot 7\text{H}_2\text{O}}$

Conclusion:

The purpose of this lab was to use hydrated compounds to practice calculating how many water molecules are attached to hydrated compounds. We achieved this purpose by heating and weighing hydrated compounds until there was no water left and calculating the difference between the hydrated compound and anhydrous compound to find how much water was in the hydrated compound. Potential sources of error may be inaccuracies in weighing, contamination, or water that didn't get evaporated. Potential improvements may include a moisture-free environment, and a better controlled heating solution and weighing system. From the analysis, there was about 1.53g of water in the 3g of $\text{MgSO}_4 \cdot x\text{H}_2\text{O}$, leaving about 1.47g of MgSO_4 , ~51% H_2O .

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