Name: _____ Section: _____

Experiment 3 – Separation of Copper(II) Sulfate from Sand

Discussion

Mixtures are a combination of substances in which the components keep their individual characteristics. Mixtures have variable proportions and can be separated by simple physical means. The mixture's components have different physical properties like melting point, boiling point, or solubility that allow us to selectively remove individual components from the mixture. Once separated, the percentage of each component in the original mixture can be calculated.

In this experiment, you will separate a mixture of copper(II) sulfate and sand using the physical property of solubility. You will learn about certain methods of separation that include decantation, filtration, and evaporation. Finally, the Law of Conservation of Mass will be applied to check the validity of your final calculations.

Procedure

1. Weigh about 4 –5 grams of the $CuSO_4$/sand mixture in a 100 mL beaker on the laboratory balance by taring (your instructor will explain and demonstrate).

2. Add 10-15 mL of D.I. water to the beaker, and swirl. Next, weigh and record the weight of a piece of filter paper AND an evaporating dish separately. Then assemble the filter apparatus as demonstrated by the instructor, filter the mixture, and collect the filtrate (liquid) onto the evaporating dish. Use your wash bottle (filled with D.I. water) to transfer all the undissolved solid from the beaker to the filter paper. After all the liquid has drained through the filter, wash the filter with small portions of D.I. water from the wash bottle until the washings are colorless. Again, make sure you collect ALL the filtrate and washings in the evaporating dish. Try to use small amounts of water. You will be evaporating the liquid; the more water you add, the longer it will take!

3. Prepare a steam bath by placing a 250 mL beaker, 2/3 full of water with 4 – 5 boiling chips, on a wire screen on a ring stand. Place the evaporating dish carefully on the beaker and heat the water to boiling. Heat the steam bath until the filtrate has completely evaporated. Do NOT let the steam bath boil to dryness; you may have to refill the water in the beaker occasionally. If the beaker goes dry, it must be cooled before adding water to prevent the beaker from cracking!

4. Open the filter paper onto a large watch glass. Dry the solid on the filter paper in the drying oven for 20 minutes.

5. Once your equipment has cooled, weigh both the evaporating dish and filter paper separately. Compute the weight of the $CuSO_4$ sample and sand by difference. Calculate the weight percent $CuSO_4$ and sand in the sample.

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Data and Calculations for Experiment 3

Mass of $CuSO_4$/sand mixture _____

Mass of empty evaporating dish _____

Mass of evaporating dish and dry $CuSO_4$ _____

Mass of $CuSO_4$ _____

Mass of empty filter paper _____

Mass of filter paper and sand _____

Mass of sand _____

Total mass of products _____

Calculated total percent yield _____

Percent by mass of $CuSO_4$:

Show Calculation _____

Percent by mass of sand:

Show Calculation _____