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**Student Activity- Vacuum Filtration**

**Learning Objective** **SPQ-3.C** Explain the relationship between the solubility of ionic and molecular compounds in aqueous and nonaqueous solvents, and the intermolecular interactions between particles.

**Science Practice** **2.C:**Identify experimental procedures that are aligned to a scientific question (which may include a sketch of a lab setup). **5.F** Calculate, estimate, or predict an unknown quantity from known quantities by selecting and following a logical computational pathway and attending to precision (e.g., performing dimensional analysis and attending to significant figures).

Filtration is one of several separation techniques used in chemical analysis. Today, you will learn how to separate solids from solutions using a Buchner funnel. You will be given a sample mixture containing sodium chloride solution and zinc. Using vacuum filtration you will separate out the zinc from the NaCl (aq) solution.

**How to use a Buchner funnel**

1. Always make sure the vacuum flask is securely attached to a ring stand with a clamp.

2. Make sure the Buchner funnel is securely placed in a one-hole stopper and that the stopper is placed inside the vacuum flask.

3. Connect the vacuum tube from the vacuum flask to the vacuum port of your sink.

4. Place a piece of filter paper inside the funnel.

5. Turn on the water all the way to get maximum suction.

6. Before doing any filtration, wet your filter paper with distilled water to ensure that it sticks to the bottom of the funnel. This way, no solids can escape underneath the filter paper.

7. Now you may pour your sample into your funnel.

8. When all of your sample appears dry, unplug the vacuum tube from the vacuum port of your sink. NEVER turn off the water before doing this step or water may be pulled through the vacuum tube and deposit into you flask.

9. Rinse the sample of solid with a small amount of distilled water; then reattach the vacuum tube to the vacuum port of your sink. Repeat steps 8 and 9 two more times to ensure the solid sample is thoroughly rinsed and that no solution remains on the top of you funnel.

10. Let the suction continue for a few minutes. When no more water appears to be dripping out of the bottom of the funnel, then you may unplug the vacuum tube from the vacuum port of your sink and shut off the water.

11. Carefully squeeze the top of you Buchner funnel. It is design to pop off the bottom section. In order to distinguish your sample from the other students, put your name on a piece of labeling table and place the tape on the side of your funnel top.

12. Place your sample in the drying oven for five minutes. When it is dry, we can remove it. If

 this were an actual lab, we would have weighed the funnel top before and after the filtration to determine the mass of the sample we have collected. We would also reheat the funnel top to ensure that the sample is completely dry.

**Answer the following questions:**

1. What evidence do you have that explains why the original sample was heterogeneous?

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2. How could we test for the properties of the solid remaining on the filter paper?

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3. The filtrate (the liquid that went through the filter paper) is still a mixture. Design an experiment that could be used to separate the solution into pure substances? How could we not only separate, but collect the water from the sodium chloride?

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4. Once the sodium chloride has been separated from the water, how could we test for its purity?

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5. Assuming the sodium chloride is pure, if the sample contained 5.36 grams of zinc and

 4.67 grams of sodium chloride, what are the percentages by mass of these two substances in the sample given? Remember your significant figures.