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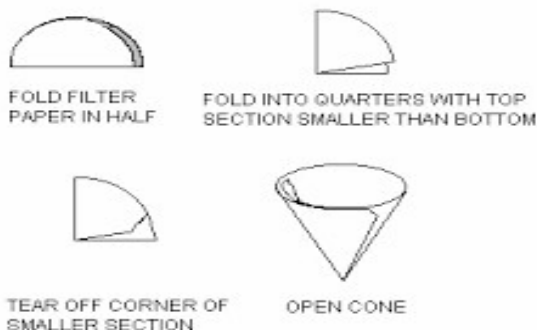
Name: \_\_\_\_\_

## Chemistry 12 Qualitative Analysis

Qualitative analysis is the process by which components of a mixture are separated and identified. Unlike quantitative analysis, where the amount of a particular material is measured, a qualitative analysis scheme simply confirms the presence or absence of certain materials. A scheme must be developed to separate the ions from each other. In this lab, we develop a **qualitative analysis scheme** to separate and identify the components of a chemical mixture. The mixture may contain all or some of iron (III) ion ( $\text{Fe}^{3+}$ ), the barium ion ( $\text{Ba}^{2+}$ ), and the silver ion ( $\text{Ag}^+$ ). We will confirm or deny the presence of an ion through precipitation. A **precipitate** (solid) of the aforementioned cations may form in the presence of a specific anion, while the remaining metal ions remain **dissolved** (in aqueous form). The precipitate may then be separated by gravity filtration, see below. The solid precipitate is then left to dry on the filter paper.

### Gravity filtration

This method of filtration is used to remove an insoluble solid material from a solution. A filter paper is folded (see below) and placed in a filter funnel which is then placed in the neck of an Erlenmeyer flask or supported in a clamp or ring stand. The solution to be filtered is then slowly and carefully poured into the funnel taking care not to fill the funnel above the edge of the filter paper. Once the solution has been poured, let it rest for a few moments to ensure that all the solution passes through. Remove the filter paper and allow the precipitate to dry.



### OBJECTIVES:

1. To confirm or deny the presence of  $\text{Fe}^{3+}$ ,  $\text{Ba}^{2+}$ , and/or  $\text{Ag}^+$  cations in a solution using qualitative analysis.
2. To write out a detailed procedure for the precipitation and separation process
3. To write out the **net precipitate reaction** for each substance added to precipitate out the desired cation (assuming that it is present)

### Procedure:

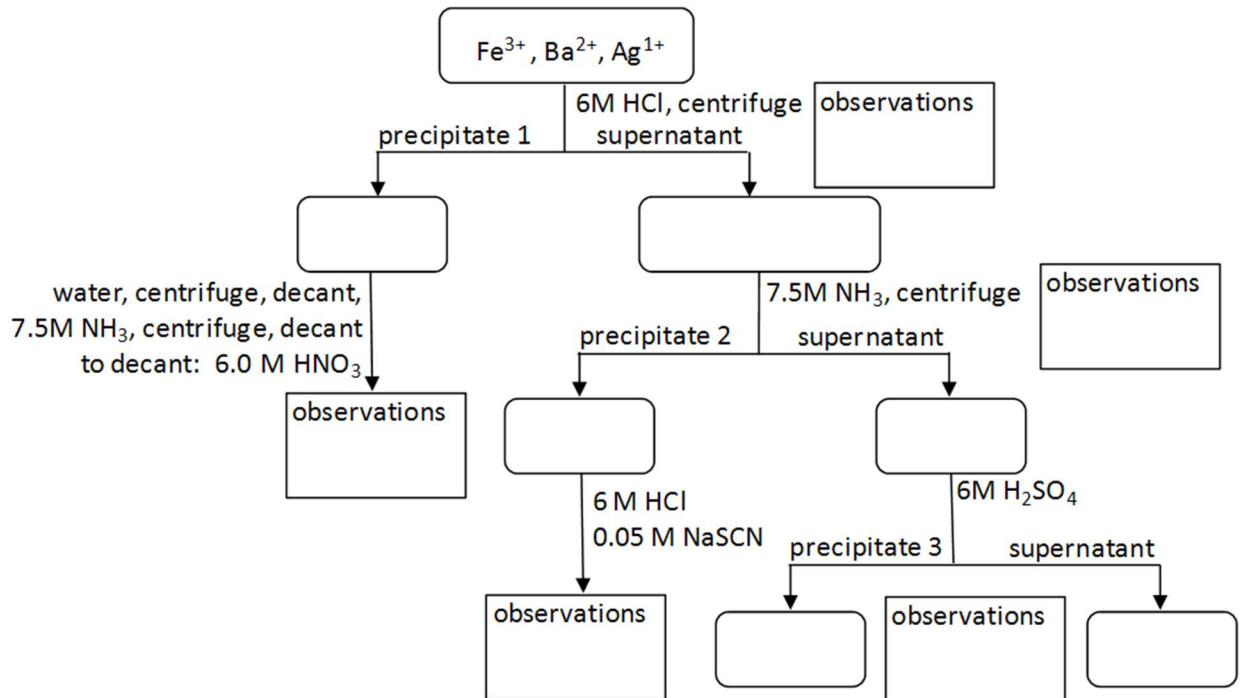
You will be given 10.0 mL of a solution that is believed to contain  $\text{Fe}^{3+}$ ,  $\text{Ba}^{2+}$ , and/or  $\text{Ag}^+$  cations. You are to design a step by step procedure for the separation of these ions (should they all be present). Write the procedure in the form of a flow chart. You will be provided with stock solutions of 1.0M NaCl, 1.0 M NaBr, 1.0 M NaI, 1.0 M  $\text{Na}_2\text{SO}_4$ , 1.0 M  $\text{Na}_2\text{S}$ , 1.0 M NaOH, 1.0 M  $\text{Na}_3\text{PO}_4$ , 1.0 M  $\text{Na}_2\text{CO}_3$  and 1.0 M  $\text{Na}_2\text{SO}_3$  for this task.

## Analysis:

As this is a qualitative lab, there is no data to analyze

## Discussion:

1. Write the **net precipitation reaction** that would occur when HCl is added to an aqueous solution containing  $\text{Fe}^{3+}$ ,  $\text{Sr}^{2+}$ , and  $\text{Ag}^+$  ions.
2. Write the **net precipitation reaction** that would occur when a solution containing  $\text{Fe}^{3+}$  and  $\text{Sr}^{2+}$  is made basic from the addition of NaOH.
3. Write the **net precipitation reaction** that would occur when  $\text{H}_2\text{SO}_4$  is added to a solution containing  $\text{Sr}^{2+}$ .
4. Complete the following flow chart:



## Sources of Error:

As this is a qualitative lab, there are no sources of error

## Conclusion:

State your solution and which ions were present.

Be sure to include a connection with everyday life!

Date: \_\_\_\_\_

Name: \_\_\_\_\_

## Qualitative Analysis Lab Report Write Up Sheet

### OBJECTIVES:

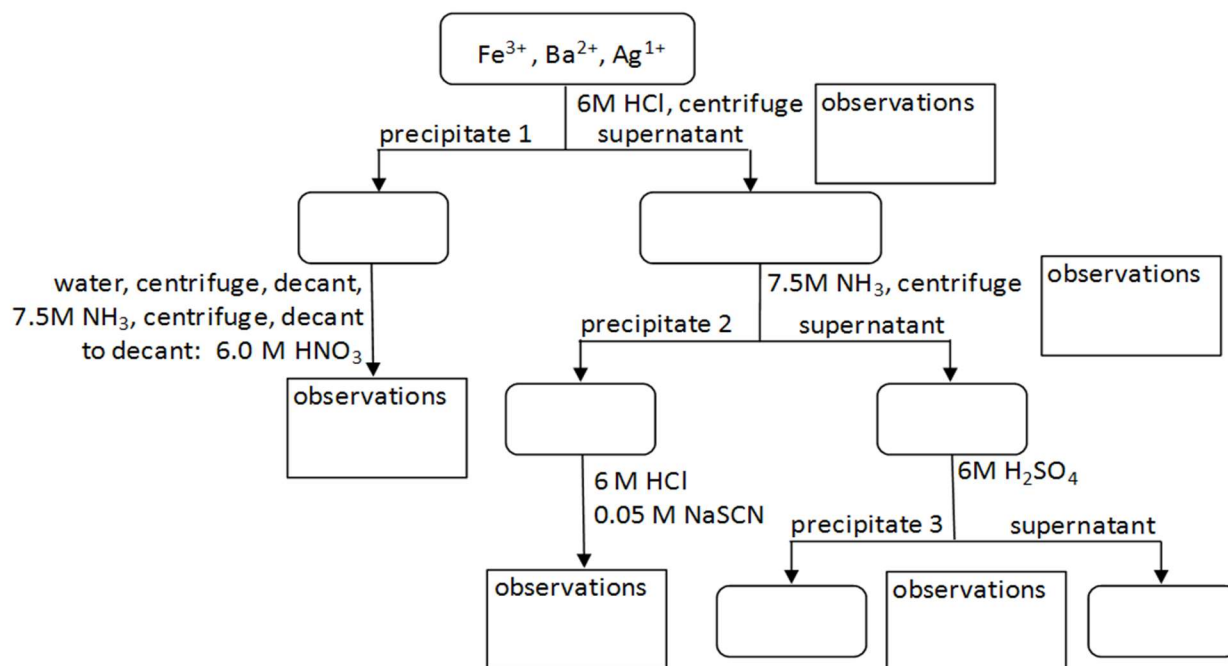
1. To confirm or deny the presence of  $\text{Fe}^{3+}$ ,  $\text{Ba}^{2+}$ , and/or  $\text{Ag}^+$  cations in a solution using qualitative analysis.
2. To write out a detailed procedure for the precipitation and separation process
3. To write out the **net precipitate reaction** for each substance added to precipitate out the desired cation (assuming that it is present)

**Procedure:** *(write a detailed explanation of the steps you will take here)*

**DATA AND OBSERVATIONS:** (create a data table and be sure to include your given solution number)

**DISCUSSION:**

1. Write the **net precipitation reaction** that would occur when HCl is added to an aqueous solution containing  $\text{Fe}^{3+}$ ,  $\text{Sr}^{2+}$ , and  $\text{Ag}^+$  ions.
2. Write the **net precipitation reaction** that would occur when a solution containing  $\text{Fe}^{3+}$  and  $\text{Sr}^{2+}$  is made basic from the addition of NaOH.
3. Write the **net precipitation reaction** that would occur when  $\text{H}_2\text{SO}_4$  is added to a solution containing  $\text{Sr}^{2+}$ .
4. Complete the following flow chart:



**CONCLUSION:** *(be sure to state the solution that you were given and then answer objectives 1 and 3 as well as a connection to everyday life)*