

## Water Testing Lab

### Purpose:

The purpose of this lab is to test for the presence of the  $\text{Ca}^{2+}$ ,  $\text{Cl}^-$ ,  $\text{Fe}^{3+}$  and  $\text{SO}_4^{2-}$  ions in two different water samples.

### Materials Needed:

Wellplate

Distilled Water

Tap Water

Natural Water Sample

Safety Goggles

Reference Samples ( $\text{Ca}^{2+}$ ,  $\text{Cl}^-$ ,  $\text{Fe}^{3+}$  and  $\text{SO}_4^{2-}$ )

Test Solutions:

Sodium Carbonate ( $\text{Na}_2\text{CO}_3$ )

Silver Nitrate ( $\text{AgNO}_3$ )

Barium Chloride ( $\text{BaCl}_2$ )

Potassium Thiocyanate ( $\text{KSCN}$ )

### Safety Precautions:

Protective goggles must be worn at all times.

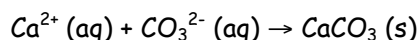
Silver Nitrate will stain clothing and *permanently* stain your skin!

### Prelab Questions:

1. What is an "aqueous solution?"
2. When a chemical equation is written out, what does the "(aq)" stand for? The "(s)"?
3. What is a precipitate and how is it formed?
4. Suppose you have a sample of water that contains all four of the ions that we are testing for. Which confirming tests will produce a precipitate? Which one(s) will produce a color change in the solution?

### Procedure:

#### 1. Calcium Ion ( $\text{Ca}^{2+}$ ) Test:



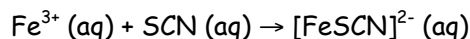
#### Reference Test:

- Place 20 drops of the  $\text{Ca}^{2+}$  reference sample into one of the wells of your wellplate
- Add 3 drops of  $\text{Na}_2\text{CO}_3$  test solution to the same well
- Record your observations, including the color and whether a precipitate formed

#### Confirming Test for Water Samples:

- Place 20 drops of distilled water in a well
- Add 3 drops of  $\text{Na}_2\text{CO}_3$  test solution to the same well
- Record your observations and decide if the ion is present
- Repeat this procedure with the tap water and the natural water
- Discard the contents of your wellplate by following your teacher's instructions

#### 2. Iron (III) Ion ( $\text{Fe}^{3+}$ ) Test:



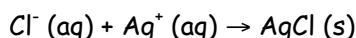
#### Reference Test:

- Place 20 drops of the  $\text{Fe}^{3+}$  reference sample into one of the wells of your wellplate
- Add 1 or 2 drops of  $\text{KSCN}$  test solution to the same well
- Record your observations, including the color and whether a precipitate formed

#### Confirming Test:

- Add 2 drops of  $\text{KSCN}$  to each of your water samples
- Record observations and decide if the ion is present

### 3. Chloride Ion ( $\text{Cl}^-$ ) Test:



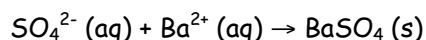
#### Reference Test:

- Add 20 drops of the  $\text{Cl}^-$  reference solution to a well
- *Note: The  $\text{Cl}^-$  reference solution is the same as the  $\text{Ca}^{2+}$  reference solution*
- Add 3 drops of  $\text{AgNO}_3$  test solution to the well

#### Confirming Test:

- Add 3 drops of the  $\text{AgNO}_3$  test solution to each of your water samples
- Record observations and decide if the ion is present

### 4. Sulfate Ion ( $\text{SO}_4^{2-}$ ) Test:



#### Reference Test:

- Add 20 drops of the  $\text{SO}_4^{2-}$  reference solution to a well
- Add 3 drops of  $\text{BaCl}_2$  test solution to the same well
- Record observations and results

#### Confirming Test:

- Add 3 drops of  $\text{BaCl}_2$  test solution to each of your water samples
- Record observations and decide if the ion is present

#### Data:

Draw this data table in your lab notebook *4 times*, once for each ion test that you will complete. Be sure to label each table to its corresponding ion test.

Ion:		
Solution	Observations	Is ion present?
Reference Test		
Distilled Water		
Tap Water		
Natural Water (List source)		

#### Analysis Questions:

1. Which ions were present in the tap water?
2. Which ions were present in your natural water sample?
3. Where did you collect your natural water sample?
4. Why was a control used in each test?
5. Why was distilled water chosen as the control?
6. What does "pure water" really mean, and is it necessary for drinking water to be pure?
7. Describe some difficulties with this type of testing procedure. Why might water testing be an expensive endeavor?
8. These types of tests cannot absolutely confirm that an ion is not present in a sample of water. Explain.
9. How might your observations have changed if you had not cleaned your wells or stirring rods thoroughly between each test?
10. Is the presence of ions in tap water harmful to humans? Explain.