

Qualitative Analysis of Water Samples

What kinds of substances are present in a glass of water? We know that there are molecules of water (H_2O) present, but are there other substances as well? People often say that water from a different area has a different taste. Could there be small amounts of substances dissolved in a water sample from one area that gives it a different composition from another sample of water?

In fact, drinking water does contain many different substances. Some are added deliberately during the process of water purification. But many substances in water occur naturally. As rainwater passes through the ground, minerals dissolve into the water. These minerals are ionic compounds that may contain ions such as calcium (Ca^{2+}), magnesium (Mg^{2+}), iron (Fe^{3+}), chloride (Cl^{-}), nitrate (NO_3^{1-}), or sulphate (SO_4^{2-}).

One method of detecting these ions is to use precipitation reactions. These reactions can also be used to identify unknown ions. In this investigation, you will use chemical tests to investigate the ions that are dissolved in water and that are present in an unknown solution.

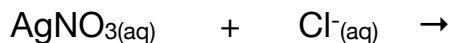
Purpose: To use precipitation reaction to identify iron (III) and chloride ions in water samples and unknown solutions.

Hypothesis: The following reactions are going to be tested. Use your solubility table to determine possible precipitates that could form

1) potassium thiocyanate + iron (III) \rightarrow



2) silver nitrate + chloride ions \rightarrow



Materials:

goggles	apron	gloves
tap water samples	distilled water	Spot plate
medicine droppers	silver nitrate $AgNO_3$	potassium chloride KCl
iron (III) nitrate $Fe(NO_3)_3$	potassium thiocyanate KCNS	

Procedure:

1. Obtain 4 dropper bottles containing potassium chloride, silver nitrate, iron (III) nitrate and potassium thiocyanate solutions.
2. Obtain a well plate. Turn it so that you have 3 columns running up and down and 4 rows across.
3. To each of the first two wells in row 1, place two drops of TAP water
4. To each of the first two wells in row 2, place two drops of DISTILLED water.
5. To the first two wells of row 3, place two drops of potassium chloride.
6. To each of the first two wells of row 4, place two drops of iron (III) nitrate.
7. Record your initial observations of ALL substances.
8. To EACH of the wells down COLUMN 1, place two drops of silver nitrate. Record your observations for each substance with silver nitrate.
9. To EACH of the wells down COLUMN 2, place two drops of potassium thiocyanate. Record your observations.
10. Pour all contents of your well plate into the waste container. Rinse off your well plate.
11. Obtain two drops of the unknown solution into two wells on the well plate. Record initial observations.
12. Add two drops of silver nitrate to one of the wells containing the unknown. Record your observations.
13. Add two drops of potassium thiocyanate to the other well containing the unknown. Record your observations.

Observations: (5 marks)

	Initial Observations	Silver Nitrate	Potassium Thiocyanate
Tap Water			
Distilled Water			
Potassium Chloride			
Iron (III) Nitrate			
Unknown Sample			

Analysis:

1. Complete the following chart. (5 marks)

	Ions present	How did you know?
Tap Water		
Distilled Water		
Potassium Chloride		
Iron (III) Nitrate		
Unknown Sample		

2) Why did you have to test distilled water for ions in this lab? What do your results tell you about distilled water? (2 marks)

3) What is the chemical name for the unknown in this lab? What is the chemical formula for the unknown in this lab? (2 marks)

SCH 4C
J. Kropac

Conclusions: (6 marks)

Was the lab successful? Why or why not? (relate this back to the purpose)

What were your major findings?

Were there any errors in this lab? How may you fix them for next time?