

Name	Section	Date of the experiment
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### Identification of Anion and Cations

#### Objective

To identify the presence of one or several ion(s) in an unknown aqueous solution by using a set of confirmatory reactions.

### CATIONS (red bottle)

#### DATA SHEET: Confirmatory test

	Test tube A (standard)	Test tube B (sample)	
Ion	Confirmatory test (observations)	Unknown solution test (observations)	Same observations for both test tube A and B? (Y / N)
Fe <sup>3+</sup>			
Al <sup>3+</sup>			
Zn <sup>2+</sup>			
Mg <sup>2+</sup>			

The unknown can have 1 or 2 ions. It is recommended to perform the 4 tests.

Unknown Number: \_\_\_\_\_

Ion(s) present in the unknown (circle) :      Fe<sup>3+</sup>              Al<sup>3+</sup>              Zn<sup>2+</sup>              Mg<sup>2+</sup>

### Main procedure

- Pour 2 mL of a standard solution containing a known ion in a small test tube "A".  
*(In a small test tube, a 2 cm height of liquid roughly correspond to a volume of 2 mL)*
- Add the appropriate reactant (or a combination of several reactants) to the test tube. The solution has to be stirred, with a glass rod, between each addition of a reactant. The observation of a chemical reaction confirms the presence of this ion. Record your observations.
- In another test tube called "B", place 2 mL of the unknown solution repeat step b. Again, your observations are recorded.
- If both test tube "A" and "B" after the reaction, look the same it confirms the presence of the same ion in both solutions. If they are different (ex: both solid but different color), the confirmation test is negative.

### Procedure: CONFIRMATION TESTS FOR THE CATIONS

Note: Concentrated acids and bases are ALWAYS ADDED DROPWISE IN THE FUMEHOOD.

To mix your chemical in a test tube use a glass rod.

Ion to identify	Reactants (to add in each tube)
$\text{Fe}^{3+}$	10 drops of 6 M $\text{NH}_4\text{OH}(\text{aq})$
$\text{Al}^{3+}$	a) 5 drops of 6 M HCl b) 1 to 2 drops of the "Aluminon" reagent (mix well) c) 15 drops of 6 M $\text{NH}_4\text{OH}$ solution
$\text{Zn}^{2+}$	3 drops of 0.2 M $\text{K}_4[\text{Fe}(\text{CN})_6]$
$\text{Mg}^{2+}$	a) 3 drops of "Magneson" reagent, (mix well) b) Add 6 M NaOH dropwise until a blue precipitate form.

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### Identification of Anion and Cations

#### Objective

To identify the presence of one or several ion(s) in an unknown aqueous solution by using a set of confirmatory reactions.

### ANIONS (blue bottle)

#### DATA SHEET: Confirmatory test

	Test tube A (standard)	Test tube B (sample)	
Ion	Confirmatory test (observations)	Unknown solution test (observations)	Same observations for both test tube A and B? (Y / N)
I <sup>-</sup>			
SO <sub>4</sub> <sup>2-</sup>			
PO <sub>4</sub> <sup>3-</sup>			
CO <sub>3</sub> <sup>2-</sup>			

The unknown can have 1 or 2 ions. It is recommended to perform the 4 tests.

Unknown Number: \_\_\_\_\_

Ion(s) present in the unknown (circle) :      I<sup>-</sup>              SO<sub>4</sub><sup>2-</sup>              PO<sub>4</sub><sup>3-</sup>              CO<sub>3</sub><sup>2-</sup>

### Main procedure

- Pour 2 mL of a standard solution containing a known ion in a small test tube "A".  
(In a small test tube, a 2 cm height of liquid roughly correspond to a volume of 2 mL)
- Add the appropriate reactant (or a combination of several reactants) to the test tube.  
The solution has to be stirred, with a glass rod, between each addition of a reactant.  
The observation of a chemical reaction confirms the presence of this ion. Record your observations.
- In another test tube called "B", place 2 mL of the unknown solution and repeat step b.  
Again, your observations are recorded.
- If both test tube "A" and "B" after the reaction, look the same it confirms the presence of the same ion in both solutions. If they are different (ex: both solid but different color), the confirmation test is negative.

### Procedure: CONFIRMATION TESTS FOR THE ANIONS

Note: Concentrated acids and bases are ALWAYS ADDED DROPWISE IN THE FUMEHOOD.

To mix your chemical in a test tube use a glass rod.

Ion to identify	Reactants (to add in each tube)
$I^-$	a) 1 mL of $FeCl_3$ solution b) 0.5 mL methylene chloride Observe the bottom layer of liquid: purple = $I_2$ present. <b>ATTENTION:</b> Discard this solution in the organic waste bin.
$SO_4^{2-}$	1 mL of 0.1 M $BaCl_2$ solution
$PO_4^{3-}$	a) 1 mL of 6 M $HNO_3$ solution b) 1 mL of 1 M $(NH_4)_2MoO_4$ solution (mix well) Put the test tube in hot water for 1 minute (see teacher).
$CO_3^{2-}$	a) Add 1 mL 6 M $HCl$ (under the fume hood) b) Carefully pour 1 mL of your standard (or unknown) onto the acid layer without mixing them. c) Insert a glass rod to mix the solution and look for any $CO_2$ gas release (intense bubbling).