Practical Work No. 4:

IDENTIFY SOME IONS PRESENT IN MINERAL WATER -(BOUGLEZ)-

I-OBJECTIVE

Qualitatively identify the major ions present in water:

Ca^{2+}, Mg^{2+}, Na^{+}, K^{+}, Cl^{-}, SO_4^{2-}, NO_3^{-}, NO_2^{-} using simple and quick tests.

II-INTRODUCTION

Mineral waters contain ions, providing essential macro-elements (calcium, sodium, magnesium, etc.) and trace elements (zinc, iodine, fluorine, selenium, etc.) for our bodies. The labels on mineral water bottles indicate the types of ions present, their mass concentration, and the water's pH.

We need to learn to choose water according to our age and

his lifestyle, his own shortcomings and excesses,
Any overdose can be harmful.

Here we are interested in a mineral water such as that : **BOUGLEZ** .

III-REQUIRED EQUIPMENT

-Test tubes, Pasteur pipettes, filter paper

-Beaker - Stirrer - 10 mL graduated pipette

- pH paper - Distilled water - Mineral water

IV-REAGENTS USED

1. REAGENTS FOR IDENTIFYING CATIONS

- Ammonium oxalate solution $(NH_4)_2C_2O_4$(0.1M)

- solution of NH_4Cl (10%), NH_4OH 1M and NaOH solution (1 M)

- 10 % Na_2HPO_4 solution, 0.5 M tartaric acid and ethanol

2. REAGENTS TO IDENTIFY ANIONS

- Silver nitrate $AgNO_3$ (0.1M) with NH_3 (1M) or NH_4OH (1M))(silver-ammonia complex).

-Barium chloride $BaCl_2$ (0.1M) + a few drops of HCl (1M)

-$FeSO_4$ (0.5M) + concentrated H_2SO_4

V- OPERATING PROCEDURES

-1. CATIONS: always take 5ml of water in each tube + responsive

A. Calcium (Ca^{2+})

Reagent: 10 drops of 10% NH_4Cl + 10 drops of 1M NH_4OH + Ammonium oxalate solution $(NH_4)_2C_2O_4$

Observation: White precipitate of CaC_2O_4 → Ca^{2+} present.

-B. Magnesium (Mg^{2+}) : there are two methods

1- Reagent **:** after the first type of filtration , add 6 drops of 10 % Na2HPO4

2- Reagent: Solution of 10 drops of 10% NH_4Cl and then add 1 M NaOH

Observation : White precipitate of $Mg(OH)_2$ → Mg^{2+} present.

-D. Potassium (K^+)

Reagent :

1 - Add 0.5 mL of the 0.5 M tartaric acid solution (drop by drop) and stir gently. Purpose: To provide the tartaric acid necessary to form the bitartrate .

2. Add 10 mL of ethanol and stir gently for ~10–30 s.

4. Place the tube in an ice bath (or in a cool place) for 5–15 minutes to promote crystallization.

Observation: White crystalline precipitate → K^+ present.

2. ANIONS

A. Chlorides (Cl^-)

Reagent: Silver nitrate $AgNO_3$

Observation: White precipitate AgCl .

Confirmation: Dissolves with NH_3 (silver-ammonia complex).

B. Sulfates (SO_4^{2-})

Reagent: Barium chloride $BaCl_2$ + a few drops of HCl

Observation: White $BaSO_4$ precipitate, insoluble.

C. Nitrates (NO_3^-)

Reagent: Brown ring test ($FeSO_4$ + concentrated H_2SO_4)

Observation: Brown ring at the interface → NO_3^-.

QUESTIONS

1-Fill in the table above?

Ion	**Reagent used**	**Observation**	**Conclusion**
Ca^{2+}	$(NH_4)_2C_2O_4$	…….....….	…….
Mg^{2+}	NH_4Cl +NaOH	…….....….	…….
K^+	tartaric acid + ethanol	…….....….	…….
Cl^-	$AgNO_3$	…….....….	…….
SO_4^{2-}	$BaCl_2$ + HCl	…….....….	…….
NO_3^-	Brown ring test	…….....….	…….

2- Name the precipitate formed in each step and give its chemical formula?

Conclusion

Noticed :

-The identification of Na^+ and NO_2^- is difficult to perform at the laboratory level