

Preparing and Analysing Salts [S]

1. Fill out the following table: [16]

Salt	Solubility in H ₂ O	Reason
Na ₂ CO ₃		
FeCl ₂		
BaSO ₄		
CuO		
Zn(NO ₃) ₂		
AgCl		
Al ₂ (SO ₄) ₃		
MgCO ₃		

2. There are three methods commonly used to prepare a salt: titration, the insoluble base method and precipitation.

a. Ammonium nitrate (NH₄NO₃) is a salt commonly used in agriculture as a fertiliser.

i. State the method used to prepare this salt: [1]

ii. Describe how a pure sample of this salt would be prepared: [9]

b. Lead iodide is an insoluble yellow salt with no particularly common use.

i. State the method used to prepare this salt: **[1]**

ii. Describe how a pure sample of this salt would be prepared: **[4]**

c. Iron(III) nitrate is a soluble violet salt used by jewellers.

i. State the method used to prepare this salt: **[1]**

ii. Describe how a pure sample of this salt would be prepared: **[4]**

3. The cation in an unknown salt is often identified using either a flame test or sodium hydroxide solution.

a. State the formula of the *ion* responsible for:

i. A crimson-red flame test: **[1]**

ii. A lilac flame test: **[1]**

iii. A green precipitate on adding sodium hydroxide solution: **[1]**

iv. Production of a gas that turns damp red litmus to blue when sodium hydroxide solution is added: **[1]**

b. Explain why sodium hydroxide solution is unable to identify the presence of potassium ions: **[2]**

4. Describe the following tests, including results, for anions:

a. Bromide ions: **[3]**

b. Sulphate ions: **[3]**

c. Barium carbonate is also an insoluble white salt.

i. Explain how the test in part b. prevents confusion between carbonate and sulphate ions: **[2]**

ii. State the test and result for the gas produced in part c. i. : **[2]**

5. Complete the following table detailing some tests for common gases: [12]

Gas	Test	Result
Ammonia		
Oxygen		
Steam		
Hydrogen		
Chlorine		

Preparing and Analysing Salts [S]

1. Fill out the following table: [16]

Salt	Solubility in H ₂ O	Reason
Na ₂ CO ₃	Yes [1]	All sodium salts are soluble [1]
FeCl ₂	Yes [1]	All chlorides (except Pb and Ag) are soluble [1]
BaSO ₄	No [1]	Barium sulphate is one of the only insoluble sulphates [1]
CuO	No [1]	All oxides (except Li, Na, K and NH ₄) are insoluble [1]
Zn(NO ₃) ₂	Yes [1]	All nitrates are soluble [1]
AgCl	No [1]	Silver chloride is one of the only insoluble chlorides [1]
Al ₂ (SO ₄) ₃	Yes [1]	All sulphates (except Mg, Ca, Pb and Ba) are soluble [1]
MgCO ₃	No [1]	All carbonates (except Li, Na, K and NH ₄) are insoluble [1]

2. There are three methods commonly used to prepare a salt: titration, the insoluble base method and precipitation.

a. Ammonium nitrate (NH₄NO₃) is a salt commonly used in agriculture as a fertiliser.

i. State the method used to prepare this salt: [1]

titration [1]

ii. Describe how a pure sample of this salt would be prepared: [9]

Ammonium hydroxide [1]

Pipette [1]

Nitric acid [1]

Indicator (methyl orange or

Burette [1]

phenolphthalein ONLY) [1]

Add one to other [1], record when indicator changes colour [1], do again without

indicator [1] and, finally, heat up and allow water to evaporate [1]

b. Lead iodide is an insoluble yellow salt with no particularly common use.

i. State the method used to prepare this salt: [1]

precipitation [1]

ii. Describe how a pure sample of this salt would be prepared: [4]

Add: lead nitrate (solution) [1] to any iodide solution (except Ag or Pb) [1]

Filter off precipitate [1] and heat to dry [1]

c. Iron(III) nitrate is a soluble violet salt used by jewellers.

i. State the method used to prepare this salt: [1]

insoluble base method

ii. Describe how a pure sample of this salt would be prepared: [4]

Add: nitric acid (solution) [1] to EITHER iron(III) carbonate or iron(III) oxide [1]

Until no more reacts [1] (allow fizzing stops if carbonate used above)

Filter out excess [1] and heat solution and allow water to evaporate [1]

3. The cation in an unknown salt is often identified using either a flame test or sodium hydroxide solution.

a. State the formula of the *ion* responsible for:

i. A crimson-red flame test: [1]

Li⁺ [1]

ii. A lilac flame test: [1]

K⁺ [1]

iii. A green precipitate on adding sodium hydroxide solution: [1]

Fe²⁺ [1]

iv. Production of a gas that turns damp red litmus to blue when sodium hydroxide solution is added: [1]

NH₄⁺ [1]

b. Explain why sodium hydroxide solution is unable to identify the presence of potassium ions: [2]

The potassium hydroxide formed is soluble [1] so is indistinguishable [1]

4. Describe the following tests, including results, for anions:

a. Bromide ions: [3]

Add: nitric acid [1] THEN silver nitrate solution [1]

Cream precipitate will form [1]

b. Sulphate ions: [3]

Add: hydrochloric acid [1] THEN barium chloride solution [1]

White precipitate will form [1]

c. Barium carbonate is also an insoluble white salt.

i. Explain how the test in part b. prevents confusion between carbonate and sulphate ions: [2]

If the anion was carbonate instead, CO₂ would be given off [1]

So you would see fizzing when the HCl was added [1]

ii. State the test and result for the gas produced in part c. i. : [2]

Limewater [1] goes cloudy [1]

5. Complete the following table detailing some tests for common gases: [12]

Gas	Test	Result
Ammonia	Damp red litmus [1]	Goes blue [1]
Oxygen	Glowing splint [1]	Relights [1]
Steam	EITHER anhydrous cobalt chloride paper [1] OR anhydrous copper sulphate [1]	Goes: blue [1] to pink [1] for cobalt chloride OR white [1] to blue [1] for copper sulphate
Hydrogen	Fire! [1]	Squeaky pop [1]
Chlorine	Damp litmus (either colour) [1]	Goes white (bleaches) [1]