

Name: _____ ()

Class: _____

Acids, Bases & Salts

Things you must be able to do

You should be able to

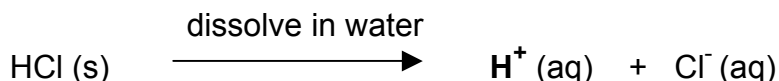
1. describe the meaning of the terms acids and alkali in terms of the ions they contain or produce in aqueous solutions.

1a(i) * **Acids contain at least 1 hydrogen atom that can become hydrogen ions (H^+) when the acids dissolve in water.**

* **Hydrogen ions (H^+) caused acidity.**

* **The more dilute the acid, the more hydrogen ions (H^+) are formed, so the more acidic it is.**

E.g. Hydrochloric acid dissolves in water to form hydrogen ions and chloride ions.



E.g. Nitric acid dissolves in water to form hydrogen ions and nitrate ions.

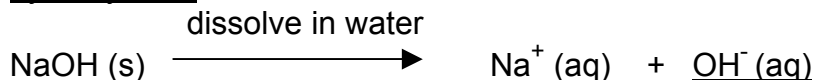
E.g. Sulphuric acid dissolves in water to form hydrogen ions and sulphate ions.

1b * **Alkali contain at least 1 hydroxyl group (-OH), that can become hydroxyl ions (OH^-) when the base dissolve in water.**

* **Hydroxyl ions (OH^-) caused alkalinity.**

* **The more dilute the alkali, the more hydroxyl ions (OH^-) are formed, so the more alkaline it is.**

E.g. Sodium hydroxide dissolves in water to form sodium ions and hydroxyl ions.



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E.g. Ammonia gas dissolves in water to form ammonium ions and hydroxyl ions (OH^-).

Things you must be able to do

You should be able to

1. describe the characteristic properties of acids as in their reactions with metals, bases and carbonates.

2a Reaction of acids with metals.

Observations:

- 1.
- 2.

General Equation (Word equation):

Write a **chemical equation** for a specific example (e.g. magnesium ribbon with hydrochloric acid.)

Write an **ionic equation** for a specific example (e.g. magnesium ribbon with hydrochloric acid)

State the test for the gas evolved & expected observation:

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2b Reaction of acids with bases.

2b(i) Reaction of acids with insoluble bases (oxides).

Observations:

1.

General Equation (Word equation):

Write a **chemical equation** for a specific example (e.g. Sodium oxide with nitric acid)

Write an **ionic equation** for a specific example (e.g. Sodium oxide with nitric acid)

2b(ii) Reaction of acids with alkali (soluble bases or hydroxide).

Observations:

1.

General Equation (Word equation):

Write a **chemical equation** for a specific example (e.g. potassium hydroxide with sulphuric acid)

Write an **ionic equation** for a specific example (e.g. Calcium oxide with HNO_3)

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2c Reaction of acids with carbonates.

Observations:

- 1.
- 2.

General Equation (Word equation):

Write a **chemical equation** for a specific example (e.g. Calcium carbonate with nitric acid)

Write an **ionic equation** for a specific example (e.g. Calcium carbonate with nitric acid)

State the test for the gas evolved & expected observation:

Things you must be able to do

You should be able to

2. describe the characteristics properties of bases as in their reactions with acids and ammonium salts.

3a Reaction of bases with acids

See section 2b above.

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3b Reaction of bases with ammonium salts

Observations:

1.

General Equation (Word equation):

Write a **chemical equation** for a specific example (e.g. sodium hydroxide with ammonium sulphate)

Write an **ionic equation** for a specific example (e.g. sodium hydroxide with ammonium sulphate)

State the test for the gas evolved & expected observation:

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Things you must be able to do

You should be able to

4. describe neutrality and relative acidity and alkalinity in terms of pH (whole numbers only).
5. describe the effect of pH on indicator papers (litmus and universal indicator paper).

Fill in the following table:

pH	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Tick the acidic pH														
Tick the alkaline pH														
Tick the neutral pH														
Write the litmus paper colour														
Write the universal indicator colour														
Nice to know information														
Methyl orange color	Yellow					orange	Pink							
Phenylthaleine	Colourless						Pink							

Acids are acidic, alkali and bases are alkaline. When added to each other, they **neutralises** each other. This processes is known as **neutralisation**.

Things you must be able to do

You should be able to

6. describe and explain the importance of controlling acidity in soil.

- Most **plants grow best at a pH of about 6.5**.
- Plants on land polluted by acid rain (pH 2 to 6) do not grow well.
- To ensure good harvest, farmers need to reduce the acidity of the soil by using **slake lime** (powder form of calcium hydroxide). This is necessary as they harvest depends on the growth

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Things you must be able to do

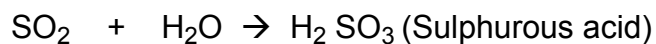
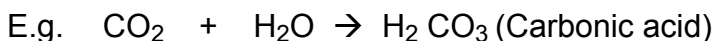
You should be able to

7. Classify oxides as either acidic, basic or amphoteric, related to metallic or non-metallic character.

7a Acidic oxides

Acidic oxides are oxides of non-metals, e.g. CO₂, SO₂, SO₃, NO₂ and NO₃.

Acidic oxides dissolve in water to form acids.



7b Basic oxides

Basic oxides are oxides of metals, e.g. Na₂O, MgO, and CaO.

Basic oxides dissolve in water to form alkalis.



7c Amphoteric oxides

Amphoteric oxides are oxides of metals that shows both acidic and basic properties. E.g. Aluminium oxide (Al₂O₃) and zinc oxide (ZnO).

General equation



General equation



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8. Describe the preparation, separation and purification using techniques such as use of suitable solvents, filtration, and crystallisation.
9. Suggest a method of preparing a given salt from suitable starting materials, given appropriate information.

8a Preparation of salts

Depending on the properties of the salt that you want, prepare it by one of the following methods:

(i) Acid with carbonate

Preferred method as excess carbonate can be easily removed by filtering, and the resulting salt solution could be crystallised.]

(ii) Acid with insoluble bases (e.g. the metal oxides)

Preferred method as excess insoluble bases can be easily removed by filtering, and the resulting salt solution could be crystallised.]

(iii) Acid with metal

Only for non-reactive metals. Excess metal can be removed by filtration and the salt obtained by crystallisation.]

Diagram

1.	Add <u>excess</u> carbonate, base or metal to acids and mixed well. [This ensures that all acids are reacted.]	
2	Filter off the <u>excess</u> carbonate, base or metal. [This ensures that possible contaminants are removed.]	
3	<u>Boil to reduce the volume of filtrate (the salt solution) by half.</u> [This produces a saturated solution.]	
4	Allow the remaining liquid to crystallise into salt crystals.	