

ACIDS, ALKALIS AND SALTS

Class 8

SLOs

- Define acids, alkalis and salts.
- Describe the properties of acids, alkalis and salts.
- Explain the uses of acids, alkalis and salts in daily life
- Define indicators and pH scale

TOPICS

- Introduction to acids, alkalis and salts
- Properties of Acids, alkalis and salts
- Uses of acids, alkalis and salts
- Preparation of Salts
- Neutralization
- pH and its Range
- Indicators

ACIDS, ALKALIS AND SALTS

Class 8

Q1. Define the following:

Acid: An acid is a substance that produces hydrogen ions, H^+ in aqueous solution.

Base: A base is any metal oxide or hydroxide that reacts with an acid to produce a salt and water only.

Alkali: An alkali is a substance that produces hydroxide ions, OH^- , in aqueous solution. An alkali is a base that is soluble in water.

Q2. Write the names of three strong acids and three weak acids.

Weak acids: citric acid, lactic acid, acetic acid.

Strong acids: hydrochloric acid, nitric acid, sulphuric acid

Q3. State the properties of Acids.

Physical Properties of Acids

- a) They have a sour taste
- b) They turn blue litmus paper red.
- c) They are soluble in water, and they produce hydrogen ions (H^+) in a solution. The more hydrogen ions an acid produces in a solution, the stronger it is.
- d) Acids turn pH paper red.
- e) Acids can conduct electricity.
- f) Strong acids are corrosive to clothes and skin.

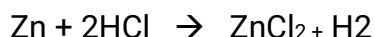
Chemical Properties of Acids

- a) Metals react with dilute acids to produce hydrogen gas and a salt.

Metals + Dilute Acid \rightarrow Salt + Hydrogen

For example:

Zinc + dilute hydrochloric acid \rightarrow zinc chloride + hydrogen gas



- b) Carbonates of metals react with dilute acids to produce a salt, water and carbon dioxide gas. Bubbles of carbon dioxide are seen and a fizzing sound is heard.

For example:

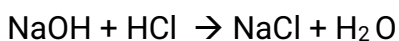
Calcium carbonate + dilute hydrochloric acid \rightarrow calcium chloride + water + carbondioxide



- c) Acids react with alkalis to produce salt and water. This reaction is called neutralization.

For example,

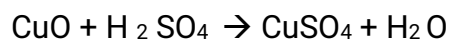
Sodium hydroxide + Hydrochloric acid \rightarrow sodium chloride + water.



- d) Metallic oxides react with acids to produce a salt and water.

For example,

copper oxide + sulphuric acid \rightarrow copper sulphate + water.



Q4. List some uses of acids.

Acid	Uses
Citric acid	Flavoring, health salts.
Hydrochloric acid	Cleaning metals before they are coated; Produced in the stomach to help digestion & to kill bacteria.
Nitric acid	Producing fertilizers & explosives.
Sulphuric acid	Car batteries; making plastics & artificial fibers; making fertilizers.
Ethanoic(Acetic) acid	Preserving food, vinegar.

Tartaric acid	Used in health salts & cake making.
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Q5. State the properties of alkalis.

Physical Properties of Alkalis

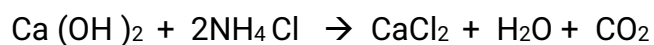
- They have a bitter taste.
- They turn red litmus paper blue.
- They are soluble in water and they produce hydroxyl ions (OH^-) in a solution. The more hydroxyl ions an alkali produces, the stronger it is.
- Alkalis can conduct electricity.
- Strong alkalis are corrosive to clothes and skin.
- Alkalis feel soapy.
- Alkalis turn pH paper purple.

Chemical Properties of Alkalis

- Alkalis react with ammonium compounds to produce ammonia gas.

For example,

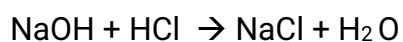
calcium hydroxide + ammonium chloride \rightarrow calcium chloride + water + ammonia



- Alkalis react with acids to produce salt and water. This reaction is called neutralization.

For example,

Sodium hydroxide + hydrochloric acid \rightarrow sodium chloride + water.



Q6. Name four alkalis.

Some common alkalis include sodium hydroxide, potassium hydroxide, calcium hydroxide & ammonium hydroxide.

Q7. List the uses of some common alkalis.

Alkalis	Uses
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Sodium Hydroxide (or Caustic Soda)	Making soaps, drain cleaners & washing powders.
Potassium Hydroxide (or Caustic Potash)	Making paint & varnish removers, dyeing cloth.
Ammonia solution (or Aqueous Ammonia)	Household cleaning liquids; making fertilizers.
Calcium hydroxide (or Slaked Lime)	Making mortar & reducing the acidity of soil.

Q8. What is a salt?

A salt is a chemical compound formed when the hydrogen of an acid is partially or wholly replaced by a metal or some other positive ion.

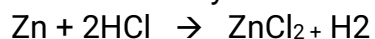
Q9. How can we prepare salt?

Salts can be made by the following methods:

a) Reaction of a dilute acid & a metal.

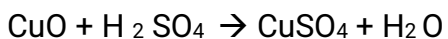
zinc + dilute sulphuric acid \rightarrow zinc sulphate + hydrogen gas

Zinc + dilute hydrochloric acid \rightarrow zinc chloride + hydrogen gas



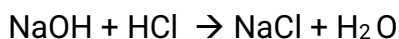
b) Reaction of an acid & a metal oxide.

copper oxide + dilute sulphuric acid \rightarrow copper sulphate + water



c) Reaction of an acid & an alkali (neutralization reaction)

Sodium hydroxide + Hydrochloric acid \rightarrow sodium chloride + water



Q10. List the uses of some common salts.

Salt	Uses
Ammonium Chloride	Batteries and washing powder
Calcium Sulphate	Plaster of Paris
Calcium Chloride	Drying agent in chemical reactions
Sodium Chloride	Flavoring and preserving food, dyeing & printing fabrics
Potassium Nitrate	Making explosives & matches, fertilizer

Q11. What do you know about pH & pH scale?

The pH of a solution is related to the concentration of hydrogen ions or hydroxide ions present in a solution.

The pH scale is a set of numbers till 14 which is used to indicate whether a solution is acidic, neutral or alkaline.

Acids have pH values less than 7.

Alkalis have pH values greater than 7.

A neutral solution has a pH value of exactly 7.

Q12. What is an indicator? Name four indicators and give the effect of acids and bases on them.

Indicators are substances that change color when they are added to acidic or alkaline solutions. Litmus, phenolphthalein & methyl orange are the examples of indicators.

Indicator	Colour in Acid	Colour in Alkali
Litmus	Red	Blue
Phenolphthalein	Colourless	Pink
Methyl Orange	Orange	Yellow
Bromothymol Blue	Yellow	Blue

Q13. What is universal indicator used for ?

Universal Indicator, a mixture of dyes, turns a range of colours corresponding to different pH values, i.e. it is used to measure pH.

Q14. What is Neutralization ? Also give some examples of neutralization.

Neutralization is the chemical reaction between a base and an acid (or an alkali and an acid) to form a salt and water.

Some everyday examples of neutralization include taking an indigestion tablet to correct excess acid in the stomach, using toothpaste to neutralize the acids which decay teeth, and adding lime to acid soils. Wasp stings, which are alkaline, can be neutralized with a weak acid such as vinegar. Bee stings contain an acid and can be neutralized with an alkali such as calamine lotion.

Q15. Complete the following reactions.

(a) zinc + hydrochloric acid \rightarrow zinc chloride + hydrogen

(b) calcium carbonate + hydrochloric acid \rightarrow calcium chloride + water + carbon dioxide

(c) zinc oxide + hydrochloric acid \rightarrow zinc chloride + water

(d) calcium hydroxide + ammonium chloride \rightarrow calcium chloride + water + ammonia

(e) sodium hydroxide + nitric acid \rightarrow sodium nitrate + water

(f) zinc + sulphuric acid \rightarrow zinc sulphate + hydrogen

(g) copper oxide + sulphuric acid \rightarrow copper sulphate + water

(h) sodium hydroxide + hydrochloric acid \rightarrow sodium chloride + water

Multiple choice questions. (MCQs)

1. Which of the following is a strong acid?

a) nitric acid

c) carbonic acid

b) citric acid

d) tartaric acid

2. Water with a pH of 7 is:

a) a salt

c) an acid

b) an alkali

d) neutral

3. Name the gas produced when an acid reacts with a metal:

a) hydrogen

c) helium

b) oxygen

d) carbon dioxide

4. Which of these chemicals is a base?

a) lemon juice

c) hydrochloric acid

b) sulphuric acid

d) calcium oxide

5. A compound that produces hydrogen ions in solution is a(n) :

a) base

c) acid

b) salt

d) alkali

6. What is the pH of a strong acid?

a) 6

b) 7

c) 1

d) 14

7. Dilute acids are substances which:

a) have a pH of more than 7

b) turn red litmus blue

c) react with magnesium producing hydrogen

d) do not conduct electricity

8. If a soil is too acidic, what should a farmer add to it?

a) compost

c) lime

b) water

d) manure

9. What is the pH of a weak acid?

a) 1

c) 7

b) 6

d) 14

10. Which of these chemicals can be found in indigestion tablets?

a) hydrochloric acid

c) sodium hydroxide

b) calcium carbonate

d) sulphuric acid

11. Which of the following products are formed when calcium carbonate reacts with sulphuric acid?

a) calcium sulphate + carbon dioxide + water

b) calcium nitrate + carbon dioxide + water

c) calcium sulphate + hydrogen

d) calcium sulphate + water

12. Which of the following will be shown to be an acid when touched with dry litmus paper?

a) washing-up liquid

c) milk

b) vinegar

d) sodium bicarbonate solution

13. Acids have a:

a) **sour taste**

b) bitter taste

c) saltish taste

d) sweet taste

14. Acids turn blue litmus paper:

a) orange

b) **red**

c) white

d) pink

15. The acid found in our stomach is:

a) nitric acid

b) sulphuric acid

c) **hydrochloric acid**

d) citric acid

16. Fizzy drinks contain:

a) nitric acid

b) citric acid

c) ascorbic acid

d) **carbonic acid**

17. What is formed when an acid reacts with an alkali?

a) salt and hydrogen

b) **salt and water**

c) salt only

d) sodium chloride

18. Which of these chemicals is a strong acid?

a) sodium hydroxide

b) calcium hydroxide

c) potassium hydroxide

d) **sulphuric acid**

19. The pH of a neutral solution is:

a) 1

b) 5

c) **7**

d) 10

20. What of the following is not true about acids?

a) tastes sour

b) **feels slippery**

c) good conductor of electricity

d) turns blue litmus paper red

