

SBG STUDY

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ch - 2

Acid, Bases and Salts

Acid: Those substances which gives H^+ ions in the aqueous solution.

Types of Acid.

1. Strong acid: Those acid which completely dissociate into H^+ ions in aqueous solution.

Ex - HCl (Hydrochloric acid)

HNO_3 (Nitrate acid)

H_2SO_4 (Sulphuric acid)

2. Weak acid: These acids which are partially dissociate into H^+ ions in aqueous sol.

Eg - $C_6H_8O_7$ (Citric)

CH_3COOH (Ethanoic acid)

H_2CO_3 (Carbonic)

3. Organic acid: These acid which are obtained from plants and animals.

Eg - Citric acid, acetic acid, oxalic acid

4. Mineral acid: Those acids which are obtained from minerals are called mineral acid.
Eg - HCl, HNO₃, H₂SO₄

5. Concentrated acid: Those acid in which minimum possible amount of water and higher amount of acid.

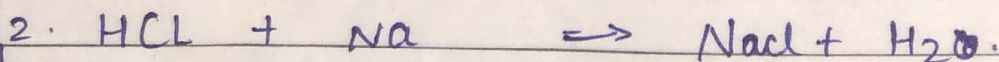
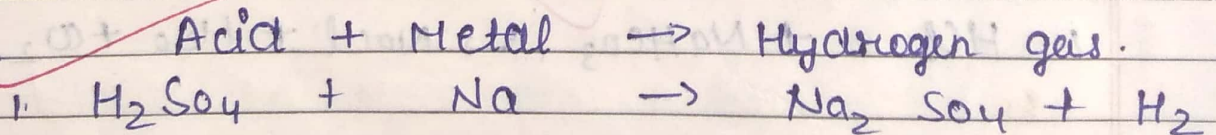
6. Dilute acid: Those acid in which minimum possible amount of acid and higher amount of water.

Physical Properties of Acid.

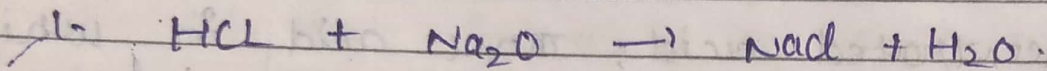
1. Acid are sour.
2. It turns blue litmus to red.
3. Acid sol. conduct electricity.
4. pH value of acid is less than 7.

Chemical Properties of Acid.

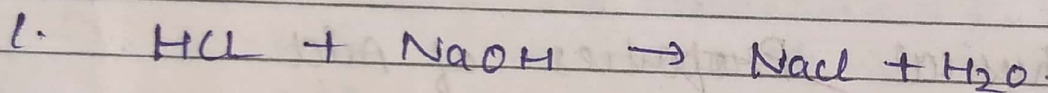
1. Reaction with Metal: When acid react with metal then it form salt and Hydrogen gas.



2. Reaction with Metal oxide: when metal acid react with metal oxide then it form salt and water.

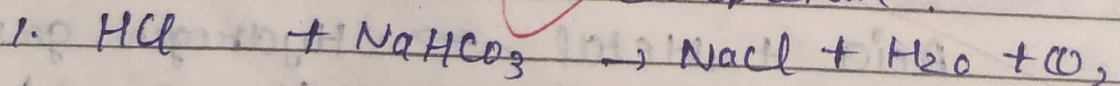


3. Reaction with Base (Neutralisation Reaction). when acid react with Base then it form salt and water and this reaction is also known as Neutralisation Reaction.



4. Reaction with Sodium carbonate! when acid react with Sodium carbonate then it form salt water and Carbon dioxide.
Ex. $\text{HCl} + \text{Na}_2\text{CO}_3 \rightarrow \text{NaCl} + \text{H}_2\text{O} + \text{CO}_2$

5. Reaction with sodium Hydrogen carbonate. when acid react with sodium Hydrogen carbonate then it form salt, water and Carbonate.



History of acid:

Greek → Lavoisier (1776) → Davy (1829) →
→ Justell von Liebig (1873) → Swante August
Arrhenius (1890) → Albert F. O. German (1905) →
Bronsted & Lowry (1923).

Bronsted & Lowry → Acid - A ability of acid to donate hydrogen ions (H^+) or protons to base which accept them.

Common Acid.

1. Acetic acid :- (CH_3COOH), vinegar, acetate.
2. Acetylsalicylic acid :- $HOOCC_6H_4OOCCH_3$, aspirin
3. Ascorbic acid :- ($C_6H_8O_6$), vitamin C.
4. Citric acid ($C_6H_8O_7$), Citrus fruits, artificial flavoring.
5. Hydrochloric acid :- (HCl), stomach acid
6. Nitric acid :- (HNO_3) fertilizers, explosives
7. Sulphuric acid :- (H_2SO_4) Car batteries

Types of Acid (state)

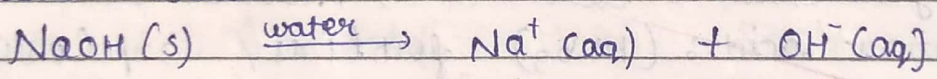
1. Solid :- HNO_3 , sulphuric acid.
2. Liquid :- Hydrochloric acid, Sulphuric
3. Gas :- ex - CO_2 , H_2S .

Common Base

1. Aluminum hydroxide ($Al(OH)_3$)
antacids, deodorants & used
2. Ammonium hydroxide (NH_4OH) glass cleaners.
3. Calcium hydroxide ($Ca(OH)_2$) caustic lime, mortar, Plaster
4. Magnesium hydroxide ($Mg(OH)_2$) laxatives, antacids
5. Sodium bicarbonate, Sodium Carbonate ($NaHCO_3$)
baking soda
6. Sodium carbonate (Na_2CO_3) dish detergent
7. Sodium hydroxide ($NaOH$) lye.
oven and drain cleaners.

BASE

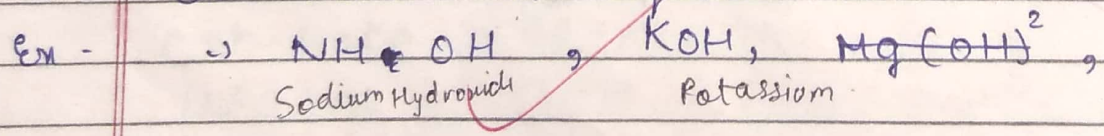
= These substances which gives OH^- in aqueous solution.



Types of Base

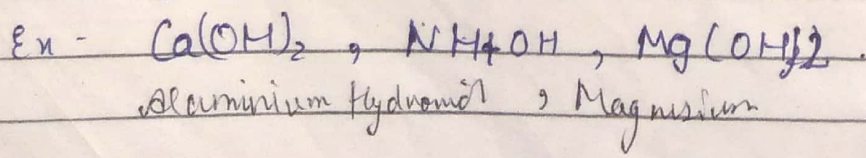
1. Strong base:

These which completely dissociate in OH^- ions in aqueous sol.



2. Weak base:

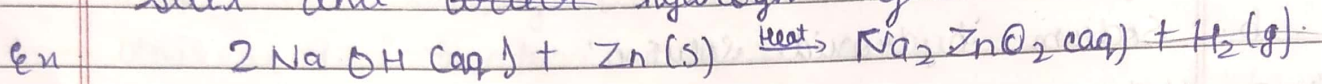
These base which partially dissociate in OH^- ions



Chemical Properties of base.

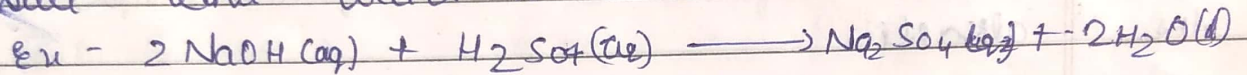
1. Reaction with metal:

when metal react with base then it form salt and water. hydrogen gas



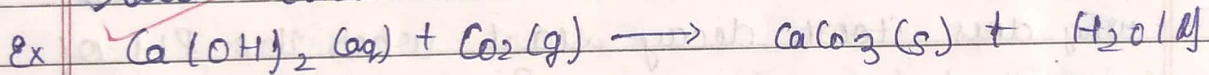
2. Reaction with Acid.

when base react with acid then it form salt and water it is also called Neutralization.



3. Reaction with non metal

when base react with non-metal then it form salt and water



Assignment - 2.1

Ques 1 Name the gas evolved when zinc granules are treated / heated with:

- a. hydrochloric acid sol.
- b. Sodium hydroxide solution.

Ans a Hydrogen

b. Hydrogen.

Ques 2 what is the common name of water soluble bases?

Ans alkalis.

Ques 3. What is common in all the water soluble bases?

Ans OH^- ions

Ques 4 why does tooth decay start when the PH of mouth is lower than 5.5?

Ans strong acid and acidity is high

Ques 5 what is the PH of a neutral sol?

Ans 7

Ques 6. which is more acidic: a sol. of PH = 2 or a sol. of PH = 6?

Ans Sol. of PH = 2.

Ques 7. which is more basic: a sol. of PH = 8 or a sol. of PH = 11?

Ans A sol. of PH = 11

Ques 8

Name the Scientist who developed the PH Scale.

Ans

Sorensen in 1909

Ques 9

Name the indicator which can give us the idea how strong or weak an acid or base is

Ans

Universal indicator

Ques 10

The PH of soil A is 7.5 while that of soil B is 4.5. which of two soils A or B, should be treated with powdered chalk to adjust the PH and why?

Ans

soil B 4.5.

Ques 11

what is the name of indicator which can be used for testing the PH of a soil?

Ans

Ques 12

what colour will be universal indicator show if you add it to following substances?

a. Potassium hydroxide, PH = 13.

Ans

Dark Purple

b. Soda water, PH = 5

Ans

Orange yellow

c. Sulphuric acid, PH = 2

Ans

Red

Ques 13

A beaker of concentrated hydrochloric acid has a PH of 1. what colour will full range universal indicator turn if it is added to this beaker? It is a strong or weak acid

Ans

Red and Strong Acid.



Ques 14 Two sol. X and Y are tested with universal indicator. Sol. X turns orange whereas sol. Y turns red. Which of the sol. is stronger acid?

Ans

Ques 15 Two sol. A and B have pH values of 3.0 and 9.5 respectively. Which of these will turn litmus sol. from blue to red and which will turn phenolphthalein from colourless to pink?

Ans

Solution A; will change litmus from blue to red.

Ques 16 Two drinks P and Q gave acidic and alkaline reactions, respectively. One has a pH value of 9 and other has pH value of 3. Which drink has pH value of 9?

Ans

Drink Q.

Ques 17 Two solutions X and Y have pH = 4 and pH = 8, respectively. Which sol. will give alkaline reaction and which one acidic?

Ans

Alkaline reaction: Solution Y; Acidic reaction, Solution X

Assignment

Ques 1

What colour the following indicators turn when added to a base or alkali (such sodium hydroxide)?

Ans

Litmus

Ques 2

What colour when indicators turns when added to an acid (such hydrochloric acid)?

Ans

Litmus

Ques 3

Name the indicator which is red in acid sol. but turns blue in basic sol?

Ans

Litmus

Ques 4

Name an indicator which is Pink in alkaline sol. but turns colourless in acidic sol.

Ans

Phenolphtheline

Ques 5

When a sol. added to a cloth strip tested treated with onion extract, then smell of onion cannot be detected. state whether the given sol. is an acid or base.

Ans

Base

Ques 6

When a sol. added to a vanilla extract then the characteristic smell of vanilla cannot be detected. state whether given sol. is an acid or base?

Ans

Base

6/6

Ques 7 How will you test for the gas which is liberated when hydrochloric acid reacts with an active metal?

Ans By burning because it produces pop sound.

Ques 8 Name the gas evolved when dilute HCl reacts with sodium hydrogen carbonate. How is it recognized?

Ans CO_2

Ques 9 Give the names and formula of two strong acid and two weak acid.

Ans a. Strong acid.

(i) Sulphuric acid (H_2SO_4)

(ii) Nitric acid (HNO_3)

(b) weak acid

(i) Ethanoic acid (CH_3COOH)

(ii) Carbonic acid (H_2CO_3)

Ques 10 Name one natural source of each of following acids:

Ans a. Citric acid. Lemon

b. Oxalic acid. Tomato

c. Lactic acid. Milk

d. Tartaric acid. Tamarind

Ques 11 Name one animal and one plant whose stings contain formic acid (or methanoic acid)

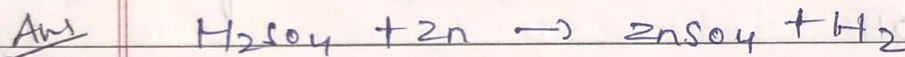
Ans: (i) Ant sting
(ii) Nettle plant.

Ques 12 How is the concentration of hydrogen ions (H_3O^+) affected when the sol. of acid is diluted?

Ans: less reactive.

Ques 13 Write word eq. and then balanced eq. for the reactions taking place when.

a Dilute sulphuric acid reacts with zinc granules.



b Dilute hydrochloric acid reacts with magnesium ribbon

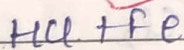
Ans

c Dilute sulphuric acid reacts with aluminium powder

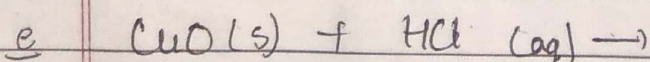
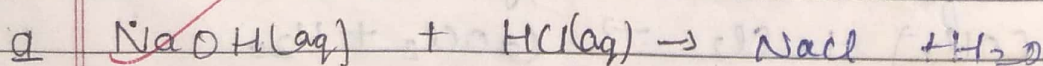
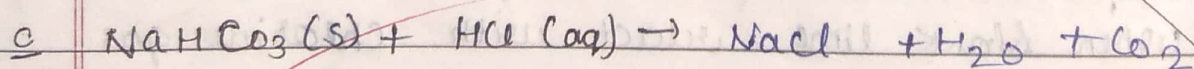
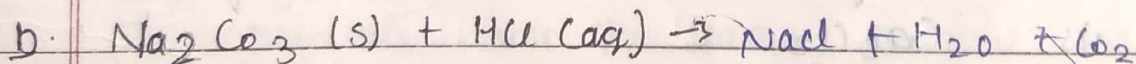
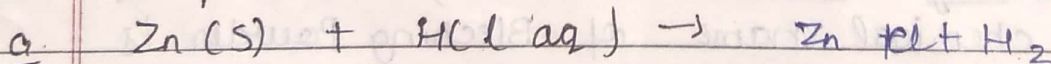
Ans

(d) Dilute hydrochloric acid reacts with iron filings

Ans



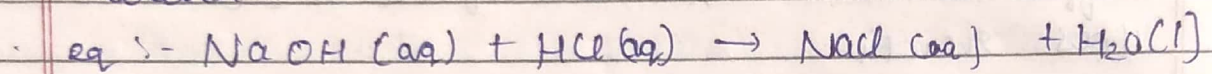
Ques 14 Complete and balance the eq.



Common Salt :- (NaCl), Sodium Chloride :-
The common name of sodium chloride is common salt its chemical formula is NaCl.

→ Preparation :-

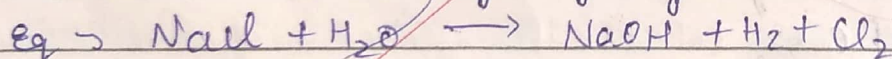
when sodium hydroxide react with hydrochloric acid then it form salt and water.



2. Caustic Soda : NaOH, (sodium hydroxide)
The common name of sodium hydroxide is caustic soda the chemical formula is NaOH.

→ Preparation :-

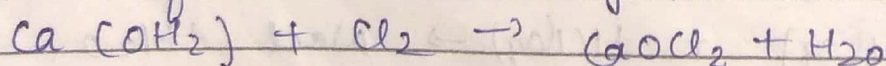
when sodium chloride react with water then it form sodium hydroxide and chloride and hydrogen gas.



3. Bleaching Powder : (CaOCl₂), Calcium oxychloride
The chemical name of Bleaching Powder is Calcium oxychloride and chemical formula is CaOCl₂.

→ Preparation :-

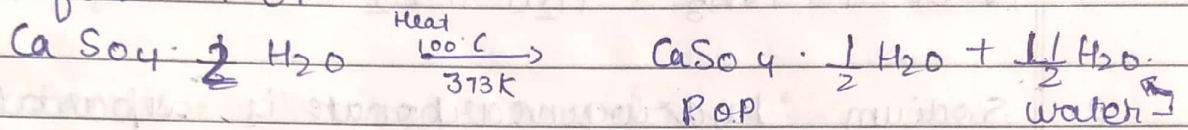
when slaked lime react with chlorine gas then it form calcium oxychloride and water.



4. Plaster of Paris (P.O.P.) ($\text{CaSO}_4 \cdot \frac{1}{2} \text{H}_2\text{O}$), hemihydrate
The chemical name of Pop. is calcium sulphate hemihydrate and its formula is $\text{CaSO}_4 \cdot \frac{1}{2} \text{H}_2\text{O}$.

→ Preparation.

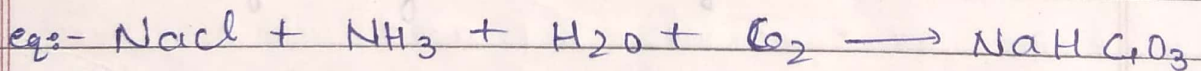
When gypsum is heated at 100°C then it forms P.O.P.



5. Baking Soda is (NaHCO_3), Sodium Hydrogen carbonate
The chemical name of Baking soda is sodium hydrogen carbonate. Its formula is NaHCO_3 .

→ Preparation.

Sodium hydrogen carbonate is produced on a large scale by reacting a ~~cold~~ cold and concentrated sol. of sodium chloride (common salt) with ammonia and carbon dioxide.

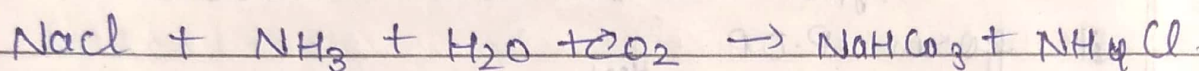


6. Washing Soda:-

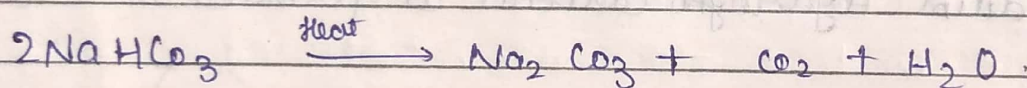
The chemical name of washing soda is sodium carbonate dehydrate. Its formula is $10 \cdot \text{H}_2\text{O}$.

Preparation of washing Soda

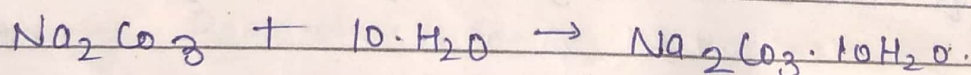
1. A cold and concentrated sol. of sodium chloride (called brine) is reacted with ammonia and carbon dioxide to obtain sodium hydrogencarbonate.



2. Sodium hydrogencarbonate is separated by filtration, dried and heated. On heating, sodium hydrogencarbonate decomposes to form sodium carbonate.



3. Anhydrous sodium carbonate (soda ash) is dissolved in water and recrystallised to get washing soda crystals containing 10 molecules of water of crystallisation.



Assignment - 3.

Ques 1 what is the chemical formula of!

- (a) baking soda. NaHCO_3
(b) washing soda. $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$

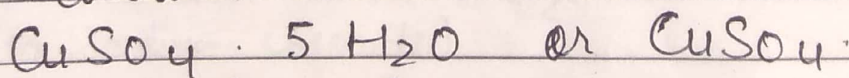
Ques 2 write the chemical formula of:

- a. Soda ash,
 Na_2CO_3
b. Sodium carbonate decahydrate.
 $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$

Ques 3 State whether the following is T/F:
Copper sulphate crystals are always wet due to the presence of water of crystallisation in them.

Ans False.

Ques 4 which of the following salt has a blue colour?



Ans Blue and Green.

Ques 5 what would the colour of litmus in a sol. of sodium carbonate?

Ans Red to Blue.

Ques 6 State the common and chemical names of the compound formed when P.O.P mixed with H_2O .
Ans Gypsum $CaSO_4 \cdot 2H_2O$.

Ques 7 with which substances should chlorine be treated to get bleaching powder?
Ans slaked lime.

Ques 8 what is the commercial name of calcium sulphate hemihydrate?
Ans Hemihydrate (P.O.P.)

Ques 9 Name the product form when Cl_2 and H_2 produced during the electrolysis of brine are made to combine.
Ans

Ques 10 Name a calcium compound which hardens on wetting with water.
Ans Plaster of Paris (P.O.P.)

Ques 11 Name a sodium compound which is a constituent of many dry soap powders.
Ans NaCl

Ques 12 Name a metal carbonate which is soluble in H_2O ?
Ans Na_2CO_3

Ques 13 Name an acid which is present in baking soda?
Ans Tartaric acid.

Ques 14 Name the metal whose carbonate is known as washing soda.

Ans Sodium

Ques 15 Which compound is used as an antacid in medicine: NaHCO_3 or Na_2CO_3 ?

Ans: NaHCO_3

Ques 16 What is the common name of:

(a) NaHCO_3

Baking soda.

(b) $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$?

Washing soda.

Ques 17 Write the chemical name and formula of:

(a) Common salt

~~NaCl~~

(b) Caustic soda.

NaOH

Ques 18 What are the two main ways in which common salt (or sodium chloride).

Ans Minerals and sea water

Ques 19 Name the major salt present in sea-water.

Ans Common salt

Ques 20 How is common salt is obtained from sea-water?

Ans Evaporation.

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Ques 21 Why is sodium chloride required in our body?

Ans To balance the respiratory system / PH value

Ques 22 Name three chemicals made from common salt (sodium chloride).

Ans Soda categories.

Ques 23 Give any two uses of common salt

Ans

Ques 24 What name is given to common salt which is mined from underground deposits? How was this salt formed?

Ans Rock Salt

Ques 25 Name the salt which is used as a Preservative in Pickles, and in curing meat and fish.

Ans NaCl.

Ques 26 Name the raw material used for the Production of caustic Soda?

Ans Common Salt NaCl + water

Ques 27 The electrolysis of an aqueous solution of sodium chloride gives us three products.

Ans NaOH, Cl₂, Hydrogen gas.