Acid, Base and Salt

Definition of an acid

An acid is a chemical substance that can provides H_3O^+ or H^+ ion in aqueous solution

Examples : HCL, H_2SO_4, HNO_3 CH_3COOH

STRONG ACID	WEAK ACID
HCOOH	HCl
CH_3COOH	H_2SO_4
H_2CO_3	HNO_3

Definition of a base

A Base can be define as a chemical substance that can produce OH^- ions in aqueous solution.

Examples : NaOH, KOH, Mg(OH)2

STRONG BASE	WEAK BASE
NaOH	NH4OH
KOH	NH3
Ca(OH)2	Pb(OH)2

Diference Between Acid & Base

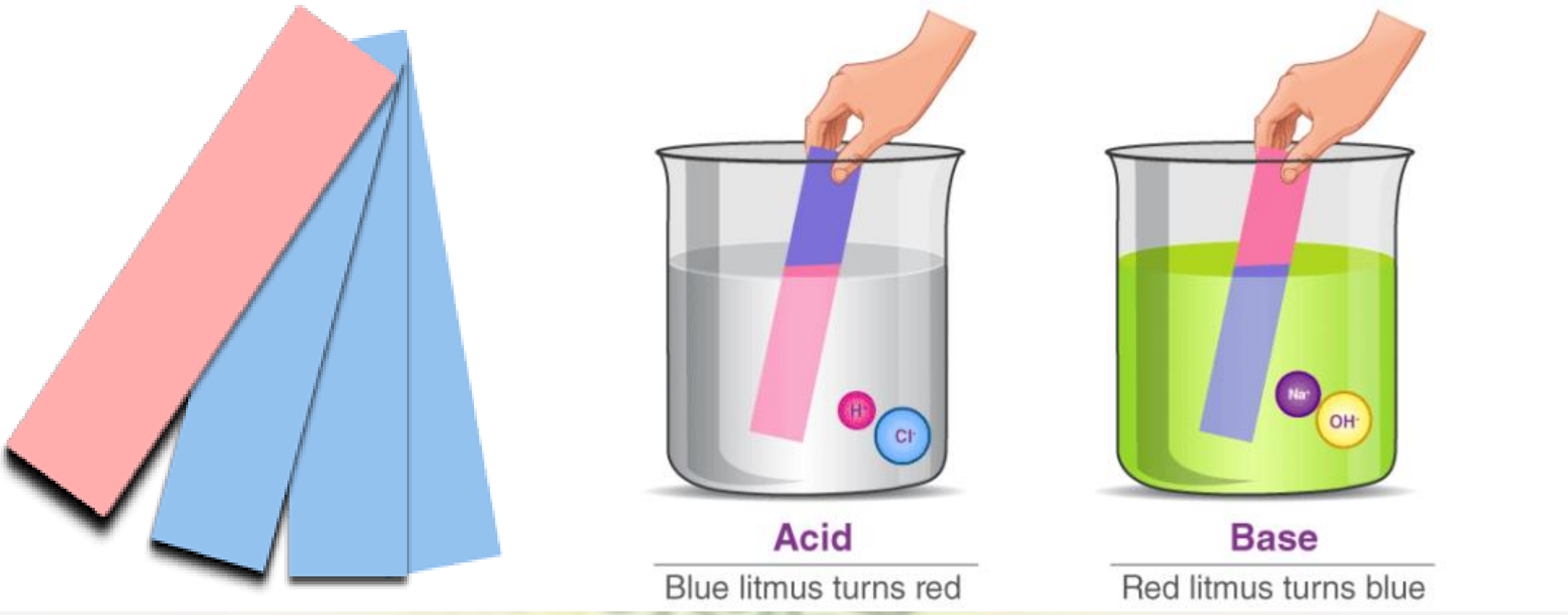
	Acids	Bases
1.	Sour in taste	Bitter in taste
2.	Turn blue litmus red	Turn red litmus blue
3.	Acids change methyl orange to red	Bases change methyl orange to yellow
4.	Phenolphthalein remains colourless	Phenolphthalein gives pink colour
5.	Acids do not give soapy touch	Soapy to touch
6.	Give hydrogen ions in solution	Give hydroxyl ions in solution

Indicator

Indicators are substances that change colour when they are added to acidic or alkaline solutions.

Eg : Litmus, phenolphthalein, and methyl orange

Litmus Paper



OLFACTORY INDICATORS

- An **Olfactory indicator** is a substance whose smell varies depending on whether it is mixed with an acidic or basic solution.

Onion

Vanilla extract

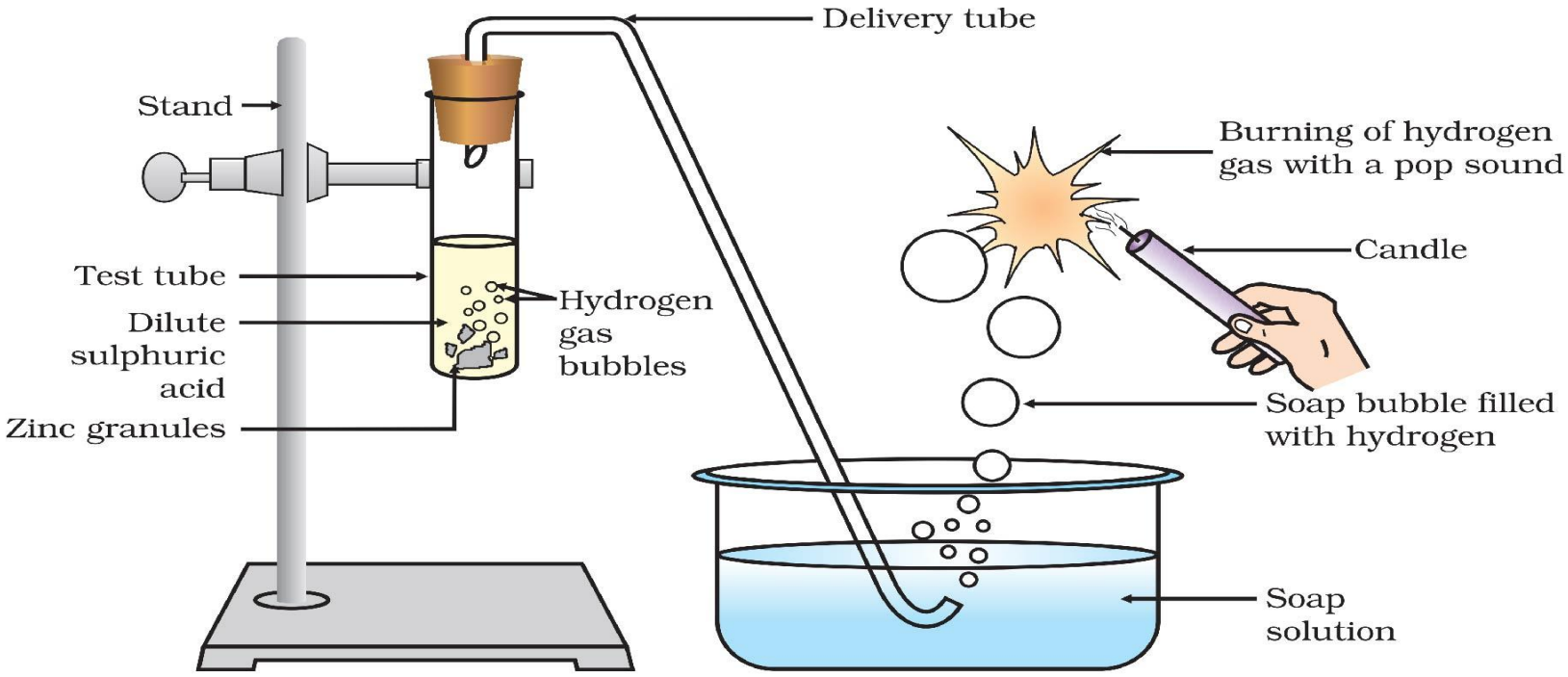
Clove oil

OLFACTORY INDICATORS

	Acid	Base
 Onion	Remains smell	Loses it's smell
 Vanilla Extract	Remains smell	Loses it's smell
 Clove Oil	Remains smell	Loses it's smell

Chemical reaction of acids

REACTION OF ZINC GRANULES WITH DILUTE SULPHURIC ACID AND TESTING HYDROGEN GAS BY BURNING



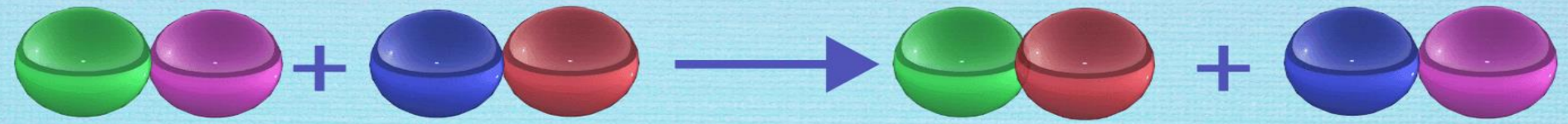
Reaction of acids with bases

Neutralization Reaction

A neutralization reaction is a chemical reaction between an acid and a base that forms a salt and water.

Acid + Base → Salt + Water

$HCl + NaOH \rightarrow NaCl + H_2O$



Double Replacement

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Reaction of Metal Carbonate with Acid

$$Na_2CO_{3(S)} + 2HCl_{(aq)} \longrightarrow 2NaCl_{(aq)} + CO_{2(g)} + H_2O_{(l)}$$

Metal Carbonate + Acid ⟶ Salt + Carbon dioxide + Water

How do acids reacts with metal hydrogen carbonates

Metal hydrogen carbonates react with acids to give a corresponding salt, carbon dioxide and water.

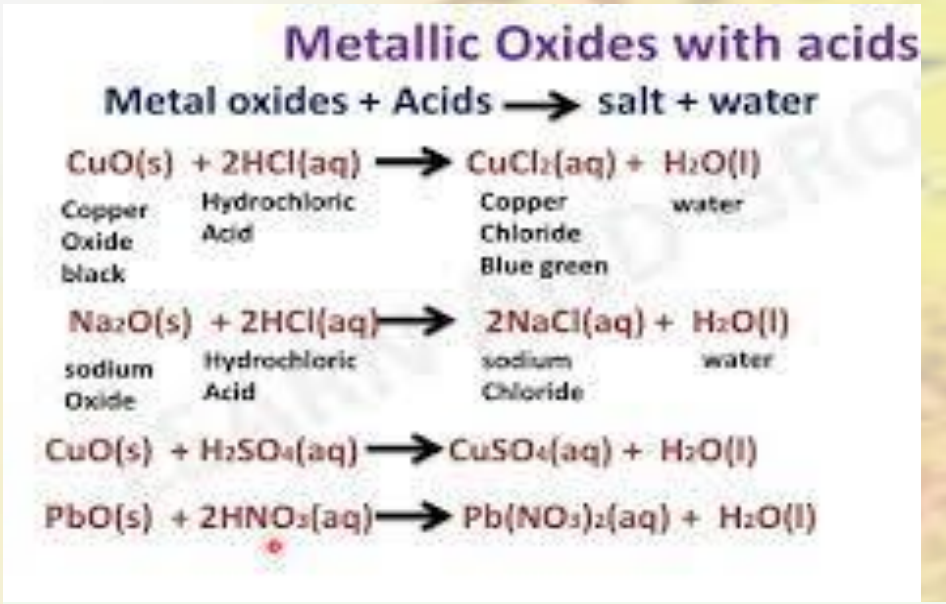
General form :

Metal hydrogen carbonate+ Acid →Salt + Carbon dioxide + Water

Example :

$NaHCO_3(s) + HCl(aq) \text{------>} NaCl(s) + H_2O(l) + CO_2(g)$

Reaction of metal oxide and acid



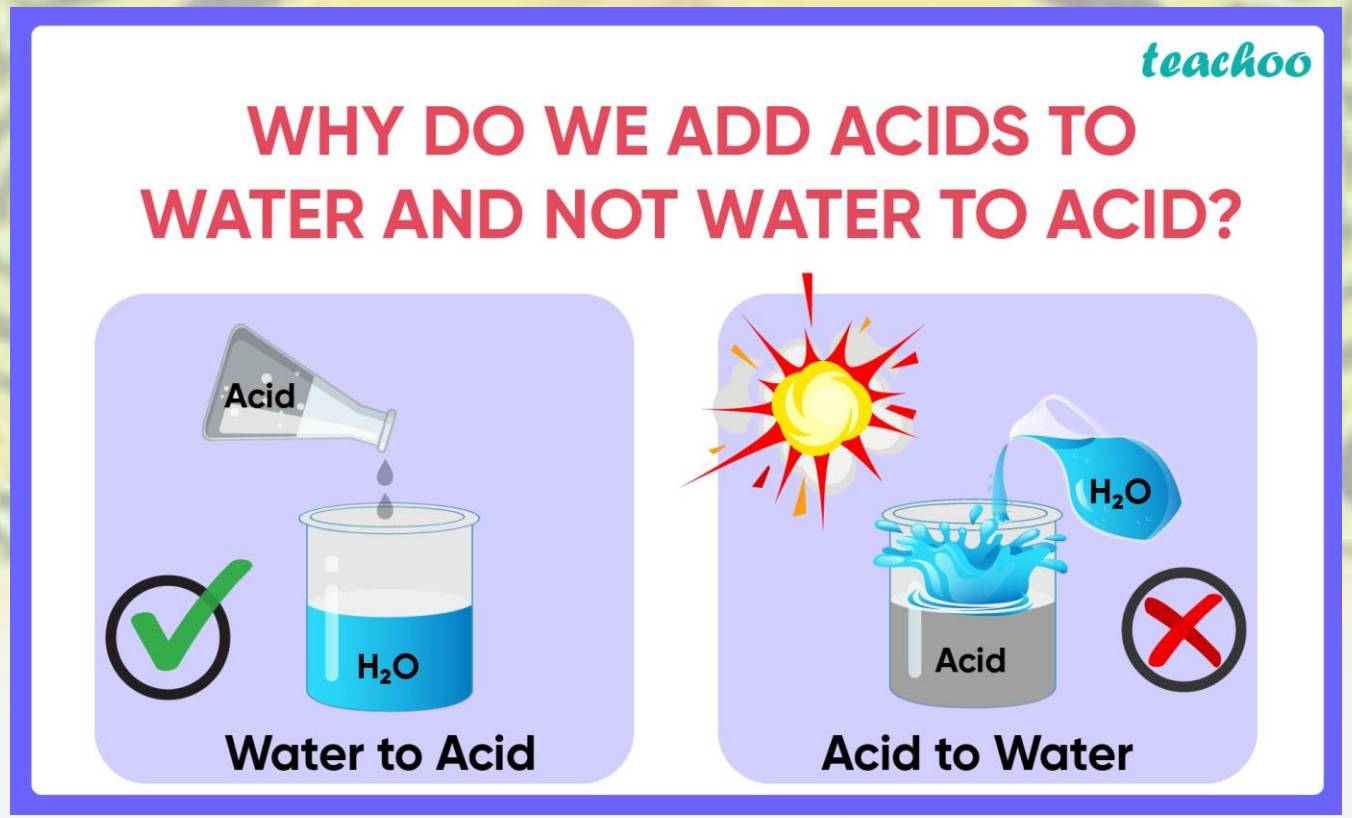
A $CaCO_3(s) + 2HCl(aq) \rightarrow CaCl_2(s) + CO_2(g) + H_2O(l)$

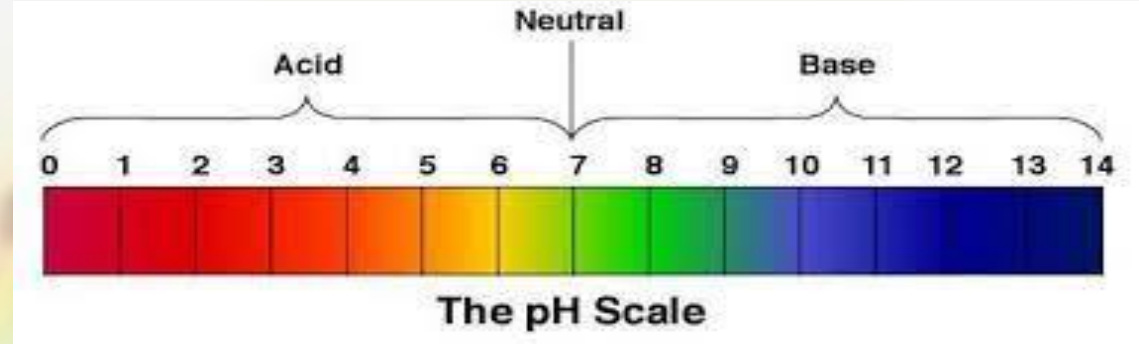
SOLUTION

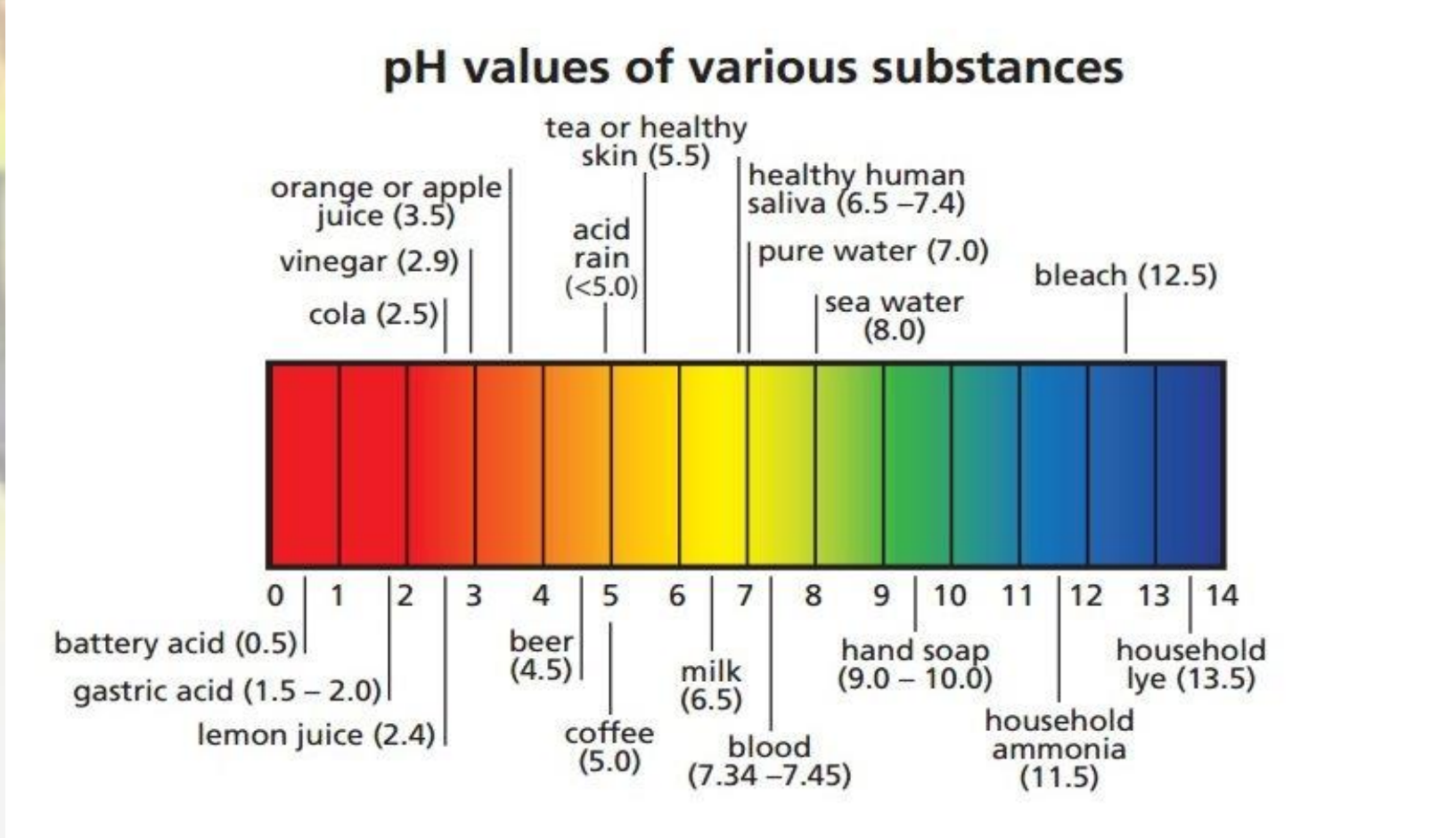
When a metal compound A on reacting with hydrochloric acid shows effervescence which shows the evolution of carbon dioxide gas and it is confirmed by putting off the candle flame. So metal compound A is a carbonate of calcium which on reacting with HCl gives calcium chloride and carbon dioxide as gas.

Dilution of acid

Acids should be added to water with constant stirring. If water is added to a concentrated acid then the acid may splash out and cause burns and the beaker may also break due to excessive local heating. This process is known as dilution and the acid added is said to be diluted







Some naturally occurring acids

Natural source	Acid	Natural source	Acid
Vinegar	Acetic acid	Sour milk (Curd)	Lactic acid
Orange	Citric acid	Lemon	Citric acid
Tamarind	Tartaric acid	Ant sting	Methanoic acid
Tomato	Oxalic acid	Nettle sting	Methanoic acid

1. The chemical formula of caustic potash is
(a)N a O H (b) C a (O H) 2 (c) N H 4 O H (d) K O H

2.Which one of the following is acidic?
(a) Lemon juice (b) Tomatoes (c) Milk (d) All

3. An aqueous solution turns red litmus solution blue. Excess addition of which of the following solution would reverse the change?
(a) Baking power (b) Lime (c) Ammonium hydroxide solution (d) Hydrochloric acid

4.Sodium hydroxide turns phenolphthalein solution
(a) pink (b) yellow (c) colourless (d) orange

5.What is the pH range of human body?
(a) 7.0 – 7.8 (b) 7.2 – 8.0 (c) 7.0 – 8.4 (d) 7.2 – 8.4