Smart Edu Hub

Gala No:5, Creative Industries, Sunder NagarNo:2, Santacruz(E). Mumbai-98. INDIA
8424052680/9819448033/02265631516

IGCSE/A LEVELS/IB Coaching Academy

&

SUPPLIERS OF TOPIC WISE PAST PAPERS FOR CHECKPOINTS/IGCSE/A LEVELS/IB

- **Key definitions**
- **Indicators**
- **Difference between strong and weak acids and bases**
- **Type of oxides**

-By Ms Aparna Gadkari

KEY DEFINITIONS

Acids: Acids are proton donors.
Bases: Bases are proton acceptors.
Strong acids: Strong acids are completely ionised when they dissolve in water.
Weak acids: Weak acids are partially ionised when they dissolve in water
Strong bases: Strong bases are completely ionised in water.
Weak bases: Weak bases are partially ionised in water.

ACIDIC OR BASIC?

Measuring the acidity of substances:

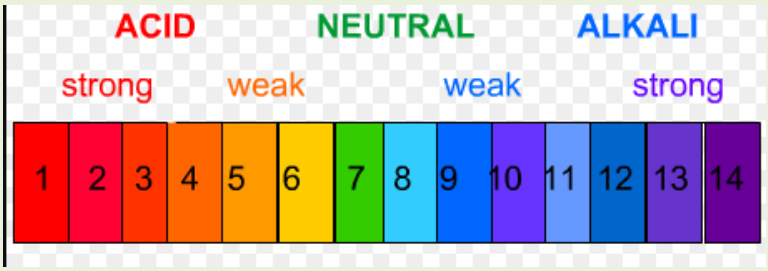
1. Acid - Base indicators (also known as pH indicators) :

- **Methyl orange, litmus and phenolphthalein:**

These are substances which change colour with pH. They themselves are usually weak acids or bases, which when dissolved in water dissociate slightly and form ions.

Indicator	Colour in strong Acids	pH at which colour changes	Colour in strong alkalis
Methyl orange	red	pH 4	yellow
Litmus	red	pH 7	blue
Phenolphthalein	colourless	pH 9	pink

- **A Universal Indicator is a mixture of indicators which give a gradual change in colour over a wide pH range - the pH of a solution can be approximately identified when a few drops of universal indicator are mixed with the solution.**



Acid -Bases

Difference between strong and weak acids:

Acids		Bases	
Strong	**Weak**	**Strong**	**Weak**
A strong acid is completely ionised in water.	A weak acid is partially ionised in water.	A strong base is completely ionised in water.	A weak base is partially ionised in water.
A strong acid conducts better than a weak acid of the same concentration because of a greater concentration of ions	A weak acid conducts poorly than a strong acid of the same concentration because of a lesser concentration of ions	A strong base conducts better than a weak base of the same concentration because of a greater concentration of ions	A weak base conducts poorly than a strong base of the same concentration because of a lesser concentration of ions
A strong acid has a lower pH due to large concentration of H^+ ions	A weak acid has a higher pH due to low concentration of H^+ ions	A strong base has a higher pH due to large concentration of OH^- ions	A weak base has a lower pH due to low concentration of OH^- ions
A strong acid has a high rate of reaction due to large concentration of H^+ ions.	A weak acid has a slow rate of reaction due to less concentration of H^+ ions.	A strong base has a high rate of reaction due to large concentration of OH^- ions.	A weak base has a slow rate of reaction due to large concentration of OH^- ions.
Eg: **hydrochloric acid** (**HCl**), hydroiodic acid (HI), hydrobromic acid (**HBr**) , **nitric acid** (**HNO_3**) and **sulphuric acid** (H_2SO_4).	Eg: **Ethanoic acid** or **(Acetic)** -CH_3COOH	Eg: Hydroxides of grp 1 & grp 2 metals Lithium hydroxide - LiOH Sodium hydroxide - NaOH Potassium hydroxide - KOH Rubidium Calcium hydroxide - $Ca(OH)_2$ Strontium hydroxide - $Sr(OH)_2$ Barium hydroxide - $Ba(OH)_2$	Eg:Ammonia(NH_3), Ammonium hydroxide (NH_4OH)

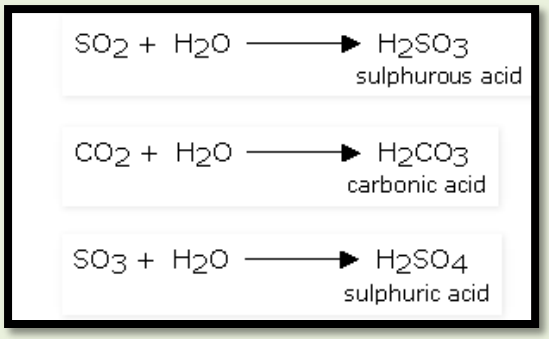
Types of oxides

Depending upon the nature and the properties exhibited by compounds, they are classified into:

- Acidic oxides
- Basic oxides
- Amphoteric oxides
- Neutral oxides

Acidic oxides:

- Most non-metallic oxides are acidic oxides. Acidic oxides are the oxides of non-metals.
- They dissolve in water to form acids
  Examples of acidic oxides are:SiO_2 ,SO_2 , SO_3 , CO_2 ,NO and NO_2



Basic oxides:

- Basic oxides are the oxides of metals.
- They do not react with alkalis.
- Many basic oxides do not react with water; except for Group 1 and a few from group 2like
- If soluble in water they react with water to produce hydroxides (alkalis)
  Examples of basic oxides are: Group 1 and 2 oxides are basic oxides

Basic oxides	Grp1 oxides (All are solube)	Li_2O	Na_2O	K_2O	Rb_2O	Cs_2O
	Group2 oxides	BeO	MgO	CaO	SrO	BaO
	Solubility increases from lithium to barium →					

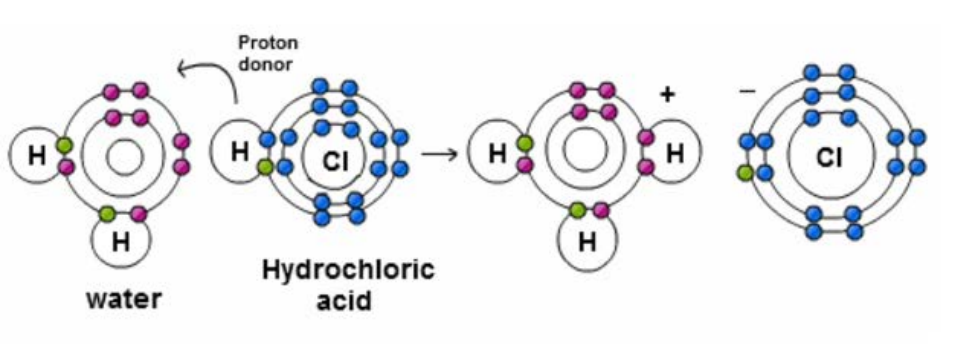
Amphoteric oxides:

These are the oxides that exhibit both acidic as well as basic properties.

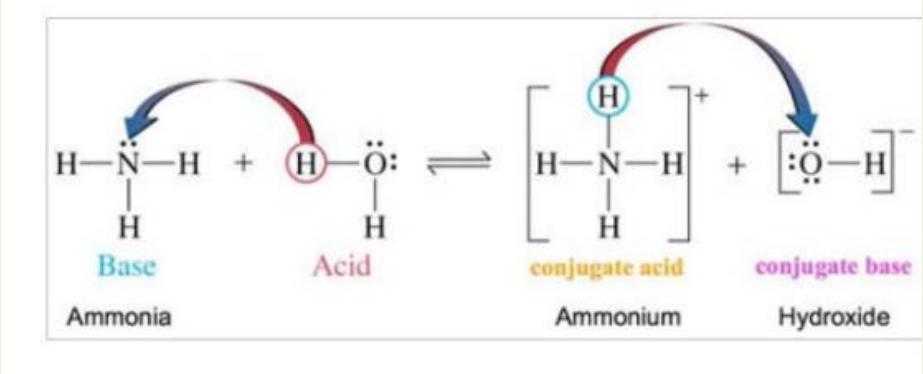
- These oxides react with acids and undergo neutralization reactions to form water and salt. This exhibits their basic property
- Similarly these oxides also react with alkalis to form salt and water, exhibiting their acidic property Examples: Al_2O_3 and ZnO.

Water is an amphoteric oxide:

When hydrochloric acid is dissolved in water, it gives proton to the water molecule, hence it is a proton donor and hence it is an acid and water is a base.



When ammonia is dissolved in water it receives a a proton from water. Hence water acts like an acid and ammonia like a base.



Reactions of Amphoteric oxides:

$ZnO(s)$	+ $2HNO_3(aq)$	--->	$Zn(NO_3)_2(aq)$	+	$H_2O(l)$
zinc oxide	nitric acid		zinc nitrate		water
$ZnO(s)$	+ 2 $NaOH(aq)$	--->	$Na_2ZnO_2(aq)$	+	$H_2O(l)$
zinc oxide	sodium hydroxide		sodium zincate		water
$Al_2O_3(s)$	+ $6HCl(aq)$	--->	$2AlCl_3(aq)$	+	$3H_2O$
aluminium oxide	hydrochloric acid		aluminium chloride		water
$Al_2O_3(s)$	+ 2 $NaOH(aq)$	--->	2 $NaAlO_2(aq)$	+	$H_2O(l)$
aluminium oxide	sodium hydroxide		sodium aluminate		water

Neutral oxides:

- Neutral oxides do not react with acids or bases.
- Eg: Nitrogen(I) oxide-N_2O/Nitrogen(II) oxide-NO/Carbon monoxide-CO
