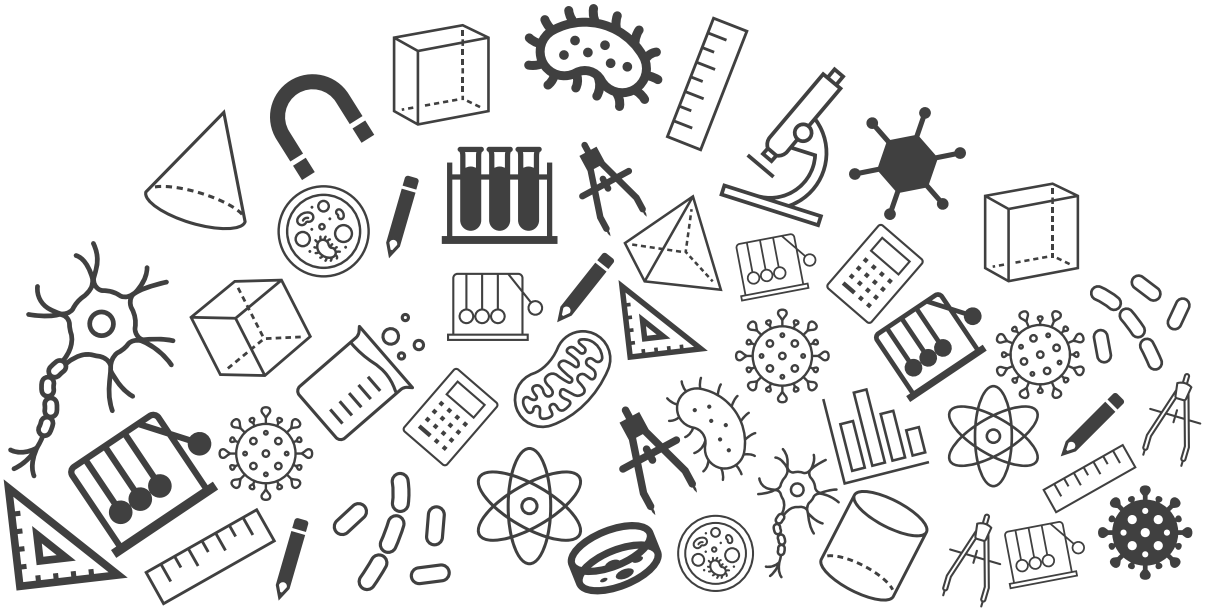
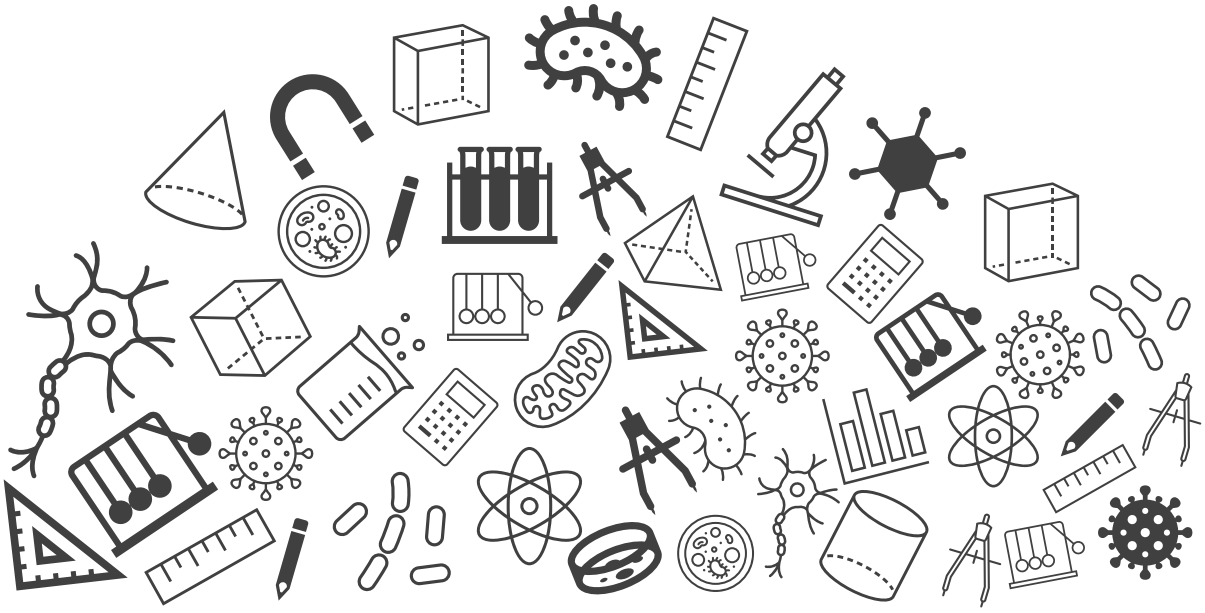
Grade 10: Science
Exam Important Questions



Acids, Bases, and Salts



Acids, Bases, and Salts

Topic : Exam Important Questions

1. Write any two physical properties of bases along with their action on at least two indicators.

[2 Marks]

Solution:

Phyical properties of bases are as follow:

Taste: They are bitter in taste.

[0.5 Marks]

Effect on skin: They give a feeling of soapy touch and most of bases have a mild corrosive action on skin.

[0.5 Marks]

Effect on Indicator:
1. Red Litmus- Red to Blue

[0.5 Marks]

2. Methyl orange- Orange to yellow

[0.5 Marks]

2. Classify bases on the basis of their strength with examples.

[2 Marks]

Solution:

On the basis of strength, bases can be classified as following:

(i) Strong alkalis or bases: The alkalis or bases which undergo complete ionisation in aqueous solution are known as strong alkalis or bases.

[0.5 Marks]

Example– NaOH

[0.5 Marks]

(ii) Weak alkalis or bases:

The alkalis or bases which undergo only partial ionisation in aqueous solution are known as weak alkalis or bases.

[0.5 Marks]

Example– $\mathrm{NH_4}OH$

[0.5 Marks]

3. (a) What happens when an acid reacts with a metal? Give the chemical equation of the reaction involved.

(b) Which gas is usually liberated when an acid reacts with a metal?

[2 Marks]

Solution

(a) Those metals which are above hydrogen in metal reactivity series will liberate hydrogen gas along with ormation of a salt on reaction with dil. acids.

[0.5 Marks]

$Metal + Acid \longrightarrow Salt + Hydrogen$

Eg. Zinc with sulphuric acid.

When zinc react with dilute sulphuric acid, zinc sulpate and hydrogen gas are produced.

$Zn(s) + H_2SO_4(aq) \longrightarrow ZnSO_4(aq) + H_2(g)$

[1 Mark]

(b) Hydrogen gas is usually liberated when an acid reacts with a metal.

[0.5 Marks]

4. When a piece of limestone reacts with dilute HCl, a gas X is produced. When gas X is passed through lime water, a white precipitate Y is formed. On passing excess of gas X, the white precipitate dissolves forming a soluble compound Z.

(a) What are X, Y and Z?

(b) Write equations for the reactions which take place:

(i) when limestone reacts with dilute HCl.

(ii) when gas X reacts with lime water to form white precipitate Y.

(iii) when excess of gas X dissolves white precipitate Y to form a soluble compound Z.

The metal carbonates reacts with acid produces metal salt, water, and carbon dioxide. When CO_2 passes through limewtaer it forms a white precipitate due to formation of calcium carbonate. And when excess of CO_2 passes through lime water it forms a soluble compound calcium bicarbonate.

(a)

X: CO_2

Y: $CaCO_3$

Z: $Ca(HCO_3)_2$

(b)

(i) Reaction of limestone with dilute HCl:

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

(ii) Reaction of gas X with limewater to produce precipitate Y:

$Ca(OH)_2(aq) + CO_2(g) \rightarrow CaCO_3(s) + H_2O(l)$

(iii) Reaction of gas X with Y (a precipitate) to form Z (a soluble compound):

$CaCO_3(s) + H_2O(l) + CO_2(g) \rightarrow Ca(HCO_3)_2(aq)$

5. Answer the following question:

(a) What happens when a dilute acid reacts with a metal oxide? Explain with the help of an example.

(b) Are there any metal oxides that react with both acids and bases? If yes, give an example.

[3 Marks]

Solution:

(a) Metal oxides are basic in nature. Acids react with metal oxides to form salt and water.

Example: Dilute sulphuric acid reacts with calcium oxide to form calcium sulphate and water.

$CaO(s) + H_2SO_4(aq) \rightarrow CaSO_4(aq) + H_2O(l)$

Salt Water

[1 Mark]

(b) Yes, there are a few oxides of amphoteric metals such as zinc and aluminium which react with acids as well as bases.

Reaction with acid:

$Al_2O_3(s) + 6HCl(aq) \rightarrow 2AlCl_3(aq) + 3H_2O(l)$

Acid

[1 Mark]

Reaction with base:

$Al_2O_3(s) + 2NaOH(aq) \rightarrow 2NaAlO_2(aq) + H_2O(l)$

Base

[1 Mark]

6. Do basic solutions contain H^+ ions? If yes, then why are these basic?

1 Mark]

Solution:

Yes, solutions of bases contain H^+ ions. A solution of an acid or a base always contains both H^+ and
OH^- ions.
Such solutions show basic character as the concentration of OH^- ions is greater than the H^+ ion concentration.

[1 Mark]

7. Sanitary worker uses a white chemical having a strong smell of chlorine gas to disinfect the water tank.
   (a) Identify the chemical compound, and write its chemical formula.
   (b) Give chemical equations for its preparation.
   (c) Write its two uses other than disinfection.

   [3 Marks]

   Solution:

   (a) The chemical compound is bleaching powder $CaOCl_2$.
   Bleaching powder is a white powder existing with a strong smell of chlorine. It is soluble in water.
   It is commonly known as bleaching powder but its main ingredient is calcium hypochlorite.

   [1 Mark]

   (b) Dry calcium hydroxide on treatment with chlorine yields bleaching powder. The reaction involved is:

   $\mathrm{Ca(OH)_2 + Cl_2 \rightarrow CaOCl_2 + H_2}O$.

   [1 Mark]

   (c) It is used as a bleaching agent and disinfectant. It undergoes decomposition in the presence of carbon dioxide gas to release chlorine along with calcium carbonate. The reaction involved is given below:

   $\mathrm{CaOCl_2(s) + CO_2(g) \rightarrow CaCO_3(s) + Cl_2(g)}$

   Apart from being used as disinfectant, it is also used to bleach washed clothes and wood pulp in paper industries.

   [0.5 Marks]

   It is also used as an oxidising agent in chemical industries.

   [0.5 Marks]

8. State the reason why baking soda is used in the following cases and also mention the reactions involved:

(a) as an antacid.
(b) as a constituent of baking powder.

[3 Marks]

Solution:

(a) It is weakly alkaline in nature and neutralizes acid (HCl) formed in the stomach.

[0.5 Marks]

The reaction involved is:

$$NaHCO_3 + HCl \rightarrow NaCl + H_2O + CO_2$$

[1 Mark]

(b) Baking soda is a leavening agents, which are substances used to help baked goods rise. Baking soda becomes activated when it's combined with both an acidic ingredient and a liquid. Upon activation, carbon dioxide is produced, which allows baked goods to rise and become light and fluffy.

[0.5 Marks]

The reaction involved is:

$$2NaHCO_3 \rightarrow Na_2CO_3 + H_2O + CO_2$$

[1 Mark]