SHIKSHA CLASSES

Subject : Science-I **ANSWERS PAPER** **Total Marks : 20**

Class : X **3. Chemical Reactions and Equations**

Q.1:A) Choose the correct alternatives : 2

1) $Fe_2O_3 + 2Al \longrightarrow Al_2O_3 + 2Fe$

The above reaction is an example of a

Ans.: d) displacement

2) Which among the following changes are exothermic in nature?

Ans.: c) Both a & b

Q. 1 : B) Solve the following question. (Any One) 1

1) Identify from the following reactions that which element undergo oxidation and reduction.

$2Mg + O_2 \longrightarrow 2MgO$

Ans.: Mg – oxidation, O_2 – reduction

2) Define corrosion.

Ans.: Corrosion : Due to various components of atmosphere oxidation of metals takes place consequently resulting in their damage. This is called corrosion.

3) Identify the type of reaction

$KNO_3 + H_2O + Heat \rightarrow KNO_3$

Ans.: Endothermic reaction

Q. 2 : A) Give scientific reason. (Any One) 2

1) It takes time for pieces of shahabad tile to disappear in HCl but its powder disappears rapidly.

Ans.: i) The rate of reaction depends upon the size of the particles of the reactants taking part in the reaction.

ii) Smaller the size of the reactant particles higher is the rate of reaction.

iii) When fine powder is used HCl gets greater surface area so it readialy react with HCl and disappear rapidly. The rate of reaction is fast.

iv) But pieces of shahabadi tile get smaller surface area of solid reactant the rate of reaction is slow so it takes time to react with HCl so the pieces of shahadadi tile takes time to disappear in HCl.

2) It is recommended to use air tight container for storing oil for long time.

Ans.: i) When oil is left exposed to air for a long time it undergoes oxidation and becomes rancid.

ii) The process of oxidation reaction of food stuff slows down by storing it in air tight container.
iii) Therefore, to avoid rancidity it is recommended to use air tight container for storing oil for long time.

Q. 2 : B) Solve the following question. (Any Two) 4

1) Balance the following equation stepwise

$SO_2 + H_2S \rightarrow S + H_2O$

Ans.:

Name of element	L. H. S.	R. H. S.
Sulphur	2	1
Oxygen	2	1
Hydrogen	2	1

Balancing of Oxygen on R. H. S.

$SO_2 + H_2S \longrightarrow S + 2H_2O$

Balancing of Hydrogen on L. H. S.

$SO_2 + 2H_2S \longrightarrow S + 2H_2O$

Balancing of S on R. H. S.

$SO_2 + 2H_2S \longrightarrow 3S + 2H_2O$ _____ Balanced.

2) Explain the following term with example.

a) Combination reaction b) Decomposition reaction

Ans: a) Combination reaction : When two or more reactants combine in a reaction to form a single product is called a combination reaction.

Example : Burning of magnesium strip in air to forms a white powder of magnesium oxide.

$2Mg + O_2 \longrightarrow 2MgO$

b) Decomposition reaction : The chemical reaction in which two or more products are formed from a single reaction is called decomposition reaction.

Example : Calcium carbonate on heating undergoes decomposition reaction to form calcium oxide and carbon dioxide gas is formed which turns limewater milky.

$CaCO_3 \xrightarrow{\triangle 1000^0 C} CaO + CO_2 \uparrow$

3) Write the difference between oxidation and reduction reaction.

Ans:

Oxidation	**Reduction**
1) The chemical reaction in which reactant gain oxygen or loses hydrogen to form the product called oxidation.	1) The chemical reaction in which reactant gain hydrogen or losses oxygen to form the product is called reduction.
2) A reducing agent under go oxidation.	2) An oxidising agent undergo reduction.
3) Example. $Mg + O_2 \longrightarrow 2MgO$	3) Example. $MgH_2 \longrightarrow Mg + H_2$

4) **Define rancidity.**

Ans: **Rancidity :** The left over oil kept for a long time get oxidised and have a foul adour and its tastes also change this process is called rancidity.

Q. 3 : Solve the following questions. (Any 2) 6

1) **How can the rate of the chemical reaction, namely, decomposition of hydrogen peroxide be increased?**

Ans: 1) The decomposition of hydrogen peroxide into water and oxygen takes place slowly at room temperature.

2) However the same reaction occurs at a faster rate on adding manganese dioxide (MnO_2) powder in it.

$$2H_2O_2 \xrightarrow{MnO_2} 2H_2O + O_2$$

3) Thus, by using a catalyst the decomposition of H_2O_2 can occur rapidly.

2) **Define displacement and double displacement reactions. Write equations for these reactions.**

Ans: **Displacement reaction :** The reaction in which the place of ion of a less reactive element in a compound is taken by another more reactive element by formation of its own ion is called displacement reaction.

$$Zn + CuSO_4 \longrightarrow ZnSO_4 + Cu$$

Double displacement reaction : The reaction in which the ions in the reactants are exchanged to form a precipitate are called double displacement reaction.

$$AgNO_3 + NaCl \longrightarrow AgCl \downarrow + NaNO_3$$

3) **Study the entries in the following table and rewrite them putting the connected items in a same row.**

Ans:

Reactant	Product	Types of chemical reaction
Fe + S	FeS	Combination
$CuSO_4$ + Zn	$ZnSO_4$ + Cu	Displacement
2Cu + O_2	2CuO	Oxidation

4) **What is the reaction called when oxidation and reduction take place simulataneously? Explain with one example.**

Ans: When oxidation and reduction reaction takes place simultaneously in single reaction the reaction is called as redox reaction.

Redox reaction = Reduction + oxidation

Example : When hydrogen gas is passed over black copper oxide a reddish coloured layer of copper is formed.

Reduction

$$CuO + H_2 \longrightarrow Cu + H_2O$$

Oxidation

1) In redox reaction one reactants gets oxidised while other gets reduced during a reaction.

2) In this reaction copper oxide lost oxygen that means reduction of copper oxide takes place where as hydrogen molecules takes up oxygen to form water molecule that means oxidation of hydrogen takes place.

3) Thus reduction of CuO and oxidation of H_2 occurs simultaneously in given reaction.

Q. 4 : Solve the following question. (Any One). **5**

1) Explain the factors affecting the rate of a chemical reaction.

Ans: Following are the factors affecting the rate of a chemical reaction.

a) **Nature of the reactants :** Nature of reactivity of reactants influences the rate of a chemical reaction For. eg: Al is more reactive than Zn. The reaction of Al with hydrochloric acid is higher than that of Zn.

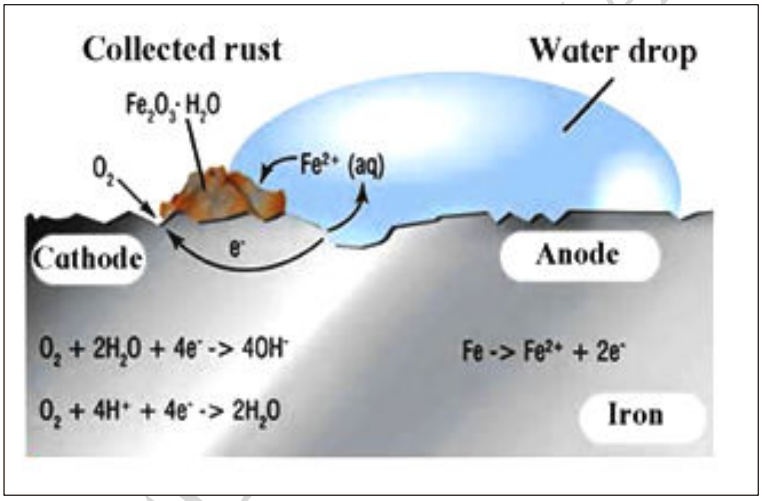
b) **Size of the particles of reactants :** Smaller the size of the reactant particles, higher is the rate of the reaction.

c) **Concentration of the reactants :** The rate of reaction is directly proportional to concentration of reactants.

d) **Temperature :** The rate of a reaction increases on inrceasing the temperature.

e) **Catalyst :** Catalyst increases the rate of a reaction .

2) Observe the following picture and write down the chemical reaction with explanation.



Ans: 1) The given picture shows the process of rusting of iron.

2) The rust is formed by an electrochemical reaction. Different regions on the surface of iron become anode and cathode.

3) Anode Reaction : Fe is oxidised to Fe^{2+} in the anode region.

$$Fe \xrightarrow{\text{lose electron}} Fe^{2+} + 2e^-$$

4) Cathode reacton : O_2 is reduced to form water in the cathode region.

$$O_2 + 4H^+ + 4e^- \longrightarrow 2H_2O$$

5) When Fe^{2+} ions migrate from the anode region they react with water and further get oxidised to form Fe^{3+} ions.

$$Fe^{2+} \xrightarrow{\text{oxidised}} Fe^{3+}$$

6) A reddish coloured hydrated oxide is formed from Fe^{3+} ions. It is called rust it collects on the surface.

$$2Fe^{3+} + 4H_2O \xrightarrow{\text{oxidised}} Fe_2O_3.H_2O. + 6H^+.$$

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