QUESTIONS AND ANSWERS OF CHEMISTRY CLASS-X

Q1: Why do we magnesium ribbon burning in air?

ANS 1.- We clean magnesium ribbon before burning in the air to remove a white layer of magnesium oxide which is formed on its surface when exposed to moist air. This hinders in the burning of magnesium ribbon.

Q2: Define the following terms with example (i) combination Reaction (ii) Decomposition Reactions (iii) Displacement Reactions (iv) Double displacement reactions (v) Oxidation-reduction Reactions.

ANS 2. (i) **Combination reactions**: the reactions in which two or more substances combine to form a single substance.

Eg: $2_{H2}+_{O2} \longrightarrow 2H_2O$

(ii) **Decomposition Reactions**: The reaction in which a single substance in decomposed to two or more substance is decomposition reaction.

Eg: $2_{H2}O \longrightarrow 2H_2+O_2$

(iii) **Displacement Reaction**: The reaction in which more reactive metal displaces less reactive metal from its salt solution is called displacement reaction.

Eg: $Fe+CuSo4 \longrightarrow Fe\ So_{4+}Cu$

(iv) **Double Displacement Reaction:** The reaction in which exchange of ions takes place are called double displacement reaction.

$AgNo_{3+}Nacl \longrightarrow Agcl+NaNo_3$

(v) **Oxidations and reduction reactions:** oxidation is grain of oxygen or loss of hydrogen Reduction is grain of hydrogen or loss of oxygen .Together they are called redox reaction.

Eg: $Cuo+H_2 \longrightarrow Cu+H_2O$

Q 3 : What happens when colorless salt of lead Nitrate and green salt of ferrous Sulphate are heated strongly in a dry test tube and white your observations in each case,

ANS 3: Thermal decomposition reaction takes place when colorless salt of lead nitrate is heated.

$2Pb\ (NO_3)_2 \rightarrow 2Pbo+4No_{2+}O_2$

Observations: (i) we in observe yellow residue of Pbo

(ii) Brown fumes of No_2gas

$FeSo_4.7H_2O \longrightarrow feSo_4+7H_2O$

Green crystals anhydrous on further heating

$2FeSO_4 \longrightarrow Fe_2O_{3+}SO_{2+}SO_3$

Observation: (i) a reddish brown Residue of Fe_2o_3

(ii) A characteristics smell of burning sulphur.

Q4: Define the term Rancidity and Corrosion, methods used to prevent rancidity and rusting ?

ANS 4: The oxidation of fats and oils in a food resulting into a bad smell and sour taste is called rancidity.

Methods to prevent rancidity:

(i) Bu adding antioxidants

(ii) Vacuum packing

(iii) Replacing air by N_2

(IV) Refrigeration.

The process of slowly eating away the surface of metals due to atmospheric gases is called corrosion.

Methods to prevent corrosion:

(i) By painting

(ii) By oiling or greasing

(iii)By galvanization

(iv)Ni or Cr plating

(v)Alloying

(vi)Anodizing

Q5: Differentiate (i) Strong acid and weak acid (ii) strong base and weak base. Give example.

ANS 5: The acid which completely ionizes H^+ in aqueous solution is called strong acid

Eg: HCl, H2SO4, HNO3

The acid which partially ionises H^+ Ions in aqueous sol is weak acid

Eg: CH_3COOH, HCOOH etc.

The base which completely ionizes OH^- Ion In waters is strong base

Eg: NaoH, KOH etc.

The base which partially ionizes OH^- ION IN water is weak base.

Eg: NH_4hN, Ca $(OH)_2$

Q 6: Reaction of di I HiI and di I Naoh with metal, Sodium Bicarbonate.

ANS 6: Reaction of dil. HCl in the metal (Na) and sodium bicarbonate.

$2HCl+2Na \longrightarrow 2Nacl+H_2$

$HCl+NaHCo_3 \longrightarrow Nacl+H_2O+Co_2$

Reaction of dil.NaoH in the metal.

$Zn+2NaOH \longrightarrow Na_2Zno_{2+}H_2$

Q 7 : Importance of PH in everyday life ,All examples of NCERT

ANS 7: Importance of PH in everyday life.

(i)**Inhuman beings and animals**: Survival of human beings and animals is between ranges of 7.0 to 7.8 PH.If PH Increases or decreases survival is difficult.

(ii)**In Plants**: Plants survive when the soil has the specific PH range which should be neither alkaline nor highly acidic.

(iii)**In digestive system**: When we eat too much junk food acid in the stomach increases beyond the required limit. Which causes pain and irritation

Remedy: It is cured by taking antacid

Eg: $Mg(OH)_2+2HCl \longrightarrow Mgcl_{2+}H_2o$

(iv) **Tooth decay caused by acid:** Tooth decay starts when PH of the mouth falls below 5.5 due to degradation of sugar and food particles by the bacteria present in the mouth.

Remedy: It is cured by using a tooth paste which in basic in nature.

(v)**Self defense of animals:** Honey bee or red ant sting had formic acid, when we are stung by them we feel pain and irritation.

REMEDY: The affected area is rubbed with solution of baking soda to neutralize the effect of acid

(vi)**Self defense in plants**: Nettle plants have leaves with stinging hairs which contain formic acid

Remedy: There grows a dock plant which is basic in nature when rubbed on effected area it neutralizes effect of acidity.

Preparation: It is prepared by chlor –alkali process when electric current is passing through brine solution

$2Nacl+2H_2o \longrightarrow 2NaOH+Cl_2+H_2$

Q 8: Prep. Properties and uses of following compounds-Caustic soda , Baking soda ,Washing soda , POP , Bleaching powder

ANS 8. : **Caustic soda**: NaoH

Properties: **1**. it is strong base

2. White crystals.

3. Corrosive in nature.

Uses:

(i) Making soap

(ii)Degreasing metals

(iii) Paper dye and rayon industry

(iv) In petroleum refining

(v) For mercerizing cotton

(vi) As laboratory reagent

Baking soda

Preparation: It is prepared by Solvay process or ammonia soda process. In this process co_2 gas is passed through ammonical brine solution.

$Nacl+H_2O+NH_3+CO_2 \longrightarrow NH_4Cl+NaHCO_3$

Properties: (I) It is white crystalline solid

(ii)It is stable in air

(iii) Soluble in H_2o

(iv) on heating it gives CO_2 gas

Eg: $2NaHCO_3 \longrightarrow Na_2co_3+H_2o+co_2$

This Co_2 aerate the dough for baking process.

(v) When react with acid it gives Co_2 gas with brisk effervescence.

$NaHCO_3+HCl \longrightarrow Nacl+H_2O+CO_2$

Uses:

(i) In medicine as antacid.

(ii)In fire extinguisher.

(iii) As additive in food and drinks.

Washing soda: $Na_2CO_3.10H_2O$

PREPARATION: It is prepared by Solvay process

Step (i) preparation of baking soda

$NaCl +H_2O+NH_3+CO_2 \longrightarrow NH4Cl+NaHCO_3$

Step (II) Thermal decomposition of $NaHCO_3$

$2NaHCO_3 \longrightarrow Na_2CO_3+CO_26H_2O$

Step (iii) Reacrystallisation of Na_2CO_3

$Na_2CO_3+10H_2o \longrightarrow Na_2CO_3.10\ H_2o$

Properties: (i) It is transparent crystalline solid containing 10 molecules of H_2o

(ii) When exposed to air it loses 9 molecules of H_2O .**The process is called efflorescence.**

$Na_2CO_3.10\ H_2o \longrightarrow Na_2CO_3.\ H_2o+9H_2O$

(iii)It is soluble in H_2o

(iv) When heated it becomes anhydrous.

$Na_2Co_3.10H_2O \rightarrow Na_2CO_{3+}10H_2O$

(V) Action with acids: give CO_2With brisk effervescence

$Na_2CO_3+2HCl \longrightarrow 2Nacl+H_2O+Co_2$

(vi)**Reaction with hard water**: It removes hardness of water.

$Cacl_{2+}Na_2Co_3 \longrightarrow_2 Nacl+Caco_3$

Uses (i) It is used for cleaning of clothes

(ii)It is used to remove permanent hardeness of water

(iii)It is used in the manufacturing of useful products like glass, paper, and borax caustic soda etc.

(iv) Used as a laboratory reagent

Pop: Plaster of Paris:

Preparation: It is prepared by heating gypsum under controlled temperature.

$CaSo_4.2H_2o \longrightarrow CaSo_4.1/2H_2O+1*1/2H_2O$

Properties: (i) It is white powder

(ii)When mixed with H_2O left for half an hour to one hour, it sets to a hard mass. Which is called gypsum?

$CaSo_4.1/2H_2O+1*1/2H_2o \longrightarrow CaSo_4.2H_2O$

Uses: (i) In medical science for setting fractured bones.

(ii) In making statues, toys, decorative material, jewellery and cosmetics.

(iii)In making the surface smooth before painting

(iv)In making chalk and fire proof materials

Bleaching powder:

Preparation: It is prepared by the action of chlorine gas on dry slaked lime $Ca\ (OH)_2$

$Ca\ (OH)_2+Cl_2 \longrightarrow Caocl_2+H_2$

The solution is milky because of some unreacted lime still present in the solution.

Properties: (i) It is a yellowish white powder

(ii) Soluble in H_2O

(III)When exposed to air it reacts with Co_2 and liberates Cl_2

$Caocl_2+CO_2 \longrightarrow CaCo_3+Cl_2$

(iv) It react with excess of acid and give Cl_2gas which is known as “available chlorine”

Uses: (i) In textile Industry for bleaching cotton

(ii)In paper industry for Bleaching wood –pulp

(iii) Laundry for Bleaching washed clothes

(iv)Make wool unshrinkable

(v) It is used for disinfecting drinking water.

(vi) It is used as an oxidizing agent because In the presence of insufficient acid it gives nascent oxygen.

(vii) It is also used to manufacture chloroform ($CHCl_3$)

Q 9: Water of crystallization and effects of Heating and Cooling.

ANS 9: The fixed number of water molecules present in one formula unit of the salt is called **water of crystallization**

On heating:

$CuSO_4.5H_2O \longrightarrow CuSo_4+5H_2O$

On adding water

$CuSO_4+5H_2O \longrightarrow CuSO_4.5H_2O$

Q10: Indicators and examples of natural and synthetic Indicators with example.

ANS 10: Those substances which distinguish between acid-base on colour or odour is known as acid base indicators.

Types of Indicators:

(i) **Natural indicators**: found in nature in plants eg: Litmus red cabbage leaves.

(ii) **Synthetic indicators**: manmade indicators

Eg: phenolphthalein and methyl orange

(iii) **Olfactory Indicators**: These Indicators give one type of odour in acidic medium and a different odour in the basic medium are called olfactory indicators

Eg: Onion adoured cloth strips vanilla essence clove oil.

Q11: Salts, types of salt and PH of salt solutions

ANS 11: Salt are the ionic compounds consisting of two parts, one part carrying a positive charge (cation) and the other carrying a negative charge (onion)

PH of salt: (A) Salt of strong acid and strong base

$Hcl+NaoH \longrightarrow Nacl+H_2o$

PHof Nacl =7

(B) Salt of strong acid and weak base

$Hcl+NH_4OH \longrightarrow NH_4cl+H_2O$

PH OF NH_4Cl is<7

(C) Salt of weak acid and strong base

$CH_3cooH+Naoh \longrightarrow CH_3COONa+H_2o$

PH OF CH_3COONa is>7

(D) Salt of weak acid and weak base

$CH_3cooH+NH_4oH \longrightarrow CH_3COONH_4+H_2o$

PH OF CH_3COONH_4 is = 7

Types of salt: (i) Based on the acids from which they are obtained.

(a) **Chlorides**: salt which are formed by the reaction of Hcl and base

Eg: Nacl, Kcl, NH4Cl, Bacl2, Mgcl2 etc.

(b)**Nitrates**: salts which are formed by the reaction of HNo_3, kNo3, Ca $(No_3)_2$, Cu $(No_3)_2$ etc.

(c) **Sulphates:** salt which are formed by the reaction between H_2SO_4 and any base

Eg: Na_2SO_4, k2SO4, MgSO4, BaSO4, CaSO4 etc.

(d**) Carbonates:** The salt which are formed by H_2CO_3 and any base

Eg: $MgCo_3$, BaCO3, Na2co3, k2CO3 etc.

(e)**Phosphates**: Acid involved is $H_3\,po_4$

Eg: Ca_3 $(Po_4)_2$, AlPo4 etc.

(f)**Acetates:** Acid Involved is CH_3COOH

Eg: CH_3CooNa,$(CH_3COO)_2$ Ca, CH_3COONH_4 etc .

Q12 : Physical and chemical properties of metals and Nonmetals.

ANS 12: Physical properties of metals and non-metal.

s.no.	Metals	Non-Metals
1	They have lustre	They do not have lustre .except : iodine
2	They are hard except : Na and k	They are soft. except :diamond
3	They are malleable (can be beaten into sheets)	They are not malleable
4	They are ductile (can be drawn into wires)	They are not ductile .They are brittle
5	Good conductors of heat and electricity	They are poor conductors of heat and electricity. Except: graphite

6	They have high M.P and B.P except :Hg and Ga	Non-metals have low M.P and B.P except: carbon
7	Metals are sonorous (i.e. produce sound when hit with a hard object)	They are non –sonorous
8	They have high density	They have low density.
9	Metals have high tensile strength	Non-metals have low tensile strength
10	Metal are generally solids except : Hg	Non-metals are either solids or gases except: Bromine

Comparison of chemical properties of metals and non metals

S.N.	Metals	Non-Metals
1	Metals are electro positive Eg: $Na \rightarrow Na^+$	They are electronegative $cl \rightarrow cl^-$
2	Metals form Basic oxides.	Non-metals form either acidic or neutral oxides
3	Metals are reducing agents because they have a strong tendency to lose electrons	Non-Metals are oxidizing agents because they have a strong tendency to accept electrons.
4	Most of the metals displace hydrogen from water or steam	Non-Metals do not react with H_2o or steam **except:** fluorine
5	Strong metals react with acids and give H_2 gas	They do not react with acids
6	Metals combine rive with chlorine to form solid ionic chlorides which are good conductors of electricity in aqueous solution	Non-Metals combine with chlorine to form covalent chlorides which do not conduct electricity in aq. sol because they do not contain free ions.

Q 13: Define the terms ---ores,minerals,gangue.

ANS 13: Minerals: The elementary state or the compounds in the form of which the metals occur in nature are called Minerals.

The Mineral from which the metal can be extracted conveniently and economically is called an ore

Gangue or matrix: The earthy, sandy and rocky Impurities associated with the minerals are called gangue or matrix

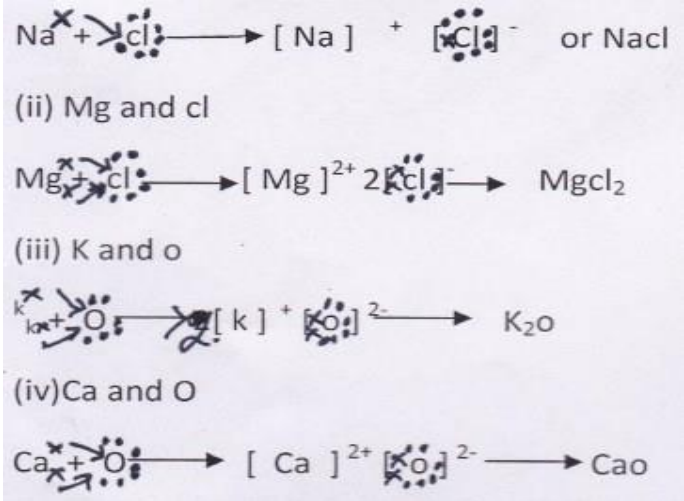
Q14: Differentiate between Roasting and calcination

ANS 14:

S.N.	Roasting	Calcinations
1	The process of heating the ore strongly in the presence of excess of air is called roasting	It is the process of heating the ore strongly in the abesece of air is called calcinations
2	It is done in Sulphide ores	It is done in carbonate ores
3	Gas evolved is So_2	Gas evolved is Co_2
4	$2Zns+3O_2 \longrightarrow Zno+2SO_2$	$ZnCO_3 \longrightarrow Zno+Co_2$

Q15 : Bonding between (i)Na and Cl (ii) Mg and Cl (iii) K and O (iv) Ca & O and properties of Electrovalent compound with reasoning.

ANS 15: Bonding between (i) Na and Cl



Properties of electrovalent or ionic compounds.

(I)**Physical property**: They are crystalline solids, relatively hard. They are brittle and break in to pieces on applying forces.

Reason: They have strong electrostatic forces of attraction between the oppositely charged ions

(ii)**Solubility**: They are soluble in H_2O but insoluble in organic solvents like benzene, alcohol, ether etc

Reason: Because of polar nature of H_2O molecules. The H_2O Molecules attract the oppositely charged ions of the ionic solid.

(iii) **M.P and B.P: They have high M.P and B.P**

Reason: Ionic compounds are formed when oppositely charged ions are held together by strong eletrolastatic forms of attraction. They require a lot of heat to break them in to ions

(iv) **Electrical conductibility**: Ionic compounds conduct electricity in the aq.sol.

Reason: They produce free ions in H_2O

$Nacl \longrightarrow Na^+ + cl^-$

(v) **Colour in the flame** : Sodium salts impart golden yellow colour to the flame.

Potassium salt ⟶ violet colour

Barium salt ⟶ Green colour

Q16 : Extraction of Hg ,Cu and Zn.

ANS 16: Extraction of Hg from cinnabar ore (Hgs)

Step 1 enrichment of the one in done by froth flotation method

Step 2 Enriched one in roasted in the presence of o_2

$2Hgs + 3O_2 \longrightarrow 2HgO + 2so_2$

Step 3 On further heating mercuric oxide is reduced to mercury.

$2Hgo \longrightarrow 2Hg + O_2$

Step 4 Refining of Impure mercury metal is done to get pure mercury

Extraction of cu from one copper glance [Cu_2S]

Step 1 enrichment of the 0ne is done by froth floation method

Step2 enriched ore is roasted in the air

$2Cu_2S+3O_2 \longrightarrow 2Cu_2O+2So_2$

Step 3 on further heating

$2Cu_2O+Cu_2S \longrightarrow 6Cu +2SO_2$

Step 4 Refining of Impure copper metal is done to get pure copper metal pure

Extraction of Zn from Zincblende (ZnS)

Step 1 Enrichment of ore by froth floatation method

Step 2 Roasting of ore in the preserve O_2

$2Zns+3O_2 \longrightarrow 2ZNo +2SO_2$

Step3 Reduction of Metal oxide (Zno) to Zn with carbon (c)

$Zno+C \longrightarrow Zn+CO$

The reduction of metal oxide with coke by heating it is called smelting.

Step4 Refining of Impure Zn metal is done to get pure Zn metal

Extraction of Zn from calamine or [$ZnCo_3$]

Step1 Enrichment of one by froth floatation

Step 2 Heating the one in absence of O_2

$ZnCo_3 \longrightarrow Zno+Co_2$[Calcination]

Step3 Reduction by coke

$Zno+c \rightarrow Zn+co$

Step 4 Refining of crude Zn to get pure Zn by electrolytic refining

Q17 : Various methods of Reduction with examples

ANS17: Various method of reduction of metal oxide to metal

(i) Reduction by heating with carbon is known as smelting

$Zno+C \longrightarrow Zn+Co$

$Fe_2o_3+3C \longrightarrow 2Fe+3Co$

(ii) Reduction by heating with aluminum

$3Mno_2+4Al \longrightarrow 3Mn+2Al_2O_3$

$Cr_2O_3+2Al \longrightarrow 2Cr + Al_2O_3$

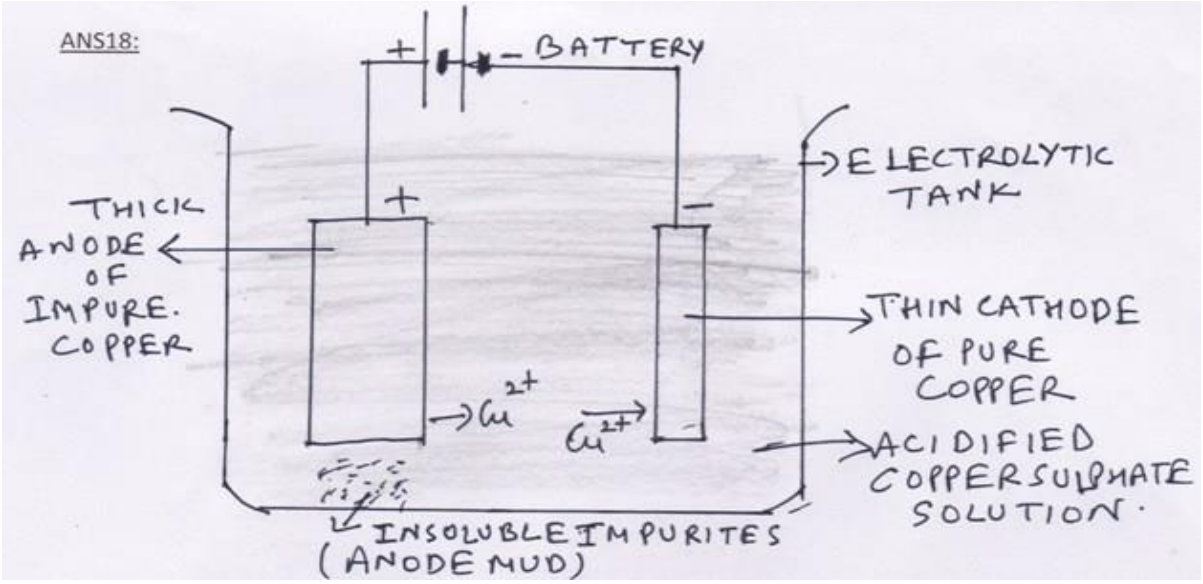
$Fe_2O_3+2Al \longrightarrow 2Fe+ Al_2O_3$

This reaction is used for welding the broken parts iron Machinery, railway, griders etc

This reaction is known as Termites reaction

The reduction of metal oxides to metal using Aluminums as reducing agent is called aluminothermy

Q 18: Electrolyh Refining cu metal with diagram and equations at anode and at cathode.



1. Thick anode is made of impure cu metal

2. Thin cathode is mode of pure cu metal

3. Asolution of acidified $CuSo_4$ is taken as electrolyte in the electrolytic tank.

4. On passing electric current, pure cu from anode passes into solution as Cu^{2+}ions

An equivalent amount of Cu^{2+} ions from solution are deposited on the cathode as pure copper

At anode: $Cu\ (s) \longrightarrow Cu^{2+}(aq)+2e^-$

At cathode: $Cu^{2+}(aq)+2e^- \longrightarrow Cu$

5. Anode becomes thin and cathode becomes thicker

6. The Impurities fall below the anode as anode mud

Q19: What are alloys? Objective of alloys, differentiate between alloy and amalgam and composition of brass , Bronze ,stainless steel ,solder

ANS19**: Alloy:** An alloy is a homogenous mixture of metal and a metal or a metal and a non-metal.If one of the metal is mercury then alloy is called amalgam

Objectives of Alloy

1. To Increase hardness: when c is added to fe its hardness increase

2. **To increase tensile strength**: cr is added in fe its hardiness Increase tensile strength

3. **To Lower M.P**: Solder an alloy of pb+sn

4. **To Modify colour:** Al is white and brown but aluminums bronze an alloy of Al+Cu has beautiful yellow colour

5. **To modify chemical REACTITY**: sodium amalgam (Na+Hg) Na is highly reactive Metal,its reactity is reduced by adding Hg in it.

Composition of Briars: Cu+Zn

Bronze: Cu+sn

Stainless steel: fe+cr+Ni

Solder: Pb+Sn

Silver: Cu+Zn+Ni

Duralumin: Al+Cu+Mg+Mn

Magnesium: Al+Mg

Q 20: Conditions necessary for rusting and its experimental verification

ANS 20: **Condition necessary for rusting and experienmental verification**

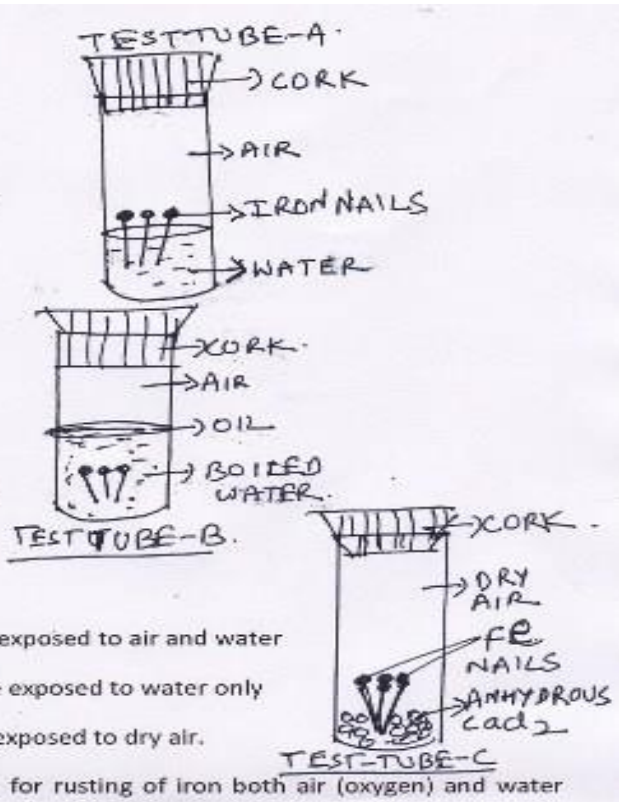
Two conditions necessary for rusting or iron are:
(i) Presence of air (or oxygen) and
(ii) Presence of water vapor (or moisture)

Experimental verification

In test tube A: Pour some unboiled water so that two thirds of the nails are dipped in water while the rest are above the water exposed to damp air conk the test tube and keep it aside for a few days

In test tube B: Pour some billed H_2o so that the nails are completely immersed add about 1 ml of oil cork the test tube and keep aside for few days

In test tube C: Place some anhydrous $cacl_2$ cork the test tube and keep it aside for few days anhydrous $cacl_2$ absorb moisture from the damp air and will make it dry



Observations: After a week it is observed that

(I)Rusting of nails occur in test tube A in which nails are exposed to air and water

(II) Rusting does not occur in test tube B in which nails are exposed to water only

(III) Rusting does not occur is test tube C in which nails is exposed to dry air.

Conclusion /result: From above expt we conclude that for rusting of iron both air (oxygen) and water (moisture) are necessary

Methods to prevent rusting

(i)Painting

(ii) Greasing and oiling

(iii)Galvanisation

(iv)Coating with tin, chromium and nickel

(v)Alloying

(vi)Anodising