

# QUICK

# QUIZ

→ Total Quick Quiz = 12

→ Overall Questions = 39



Muhammad Javed Iqbal  
100 Chemistry  
Askari Colleges Raw.

# Quick Quiz # 01

1. The electronic structure of Mg is  $1s^2, 2s^2 2p^6, 3s^2$ . Write down electronic structure of Al in same notation.

Ans  $_{13}\text{Al} = 1s^2, 2s^2 2p^6, 3s^2 3p^1$

2. Which of the two elements: Mg or Al has more stable structure?

Ans Mg has more stable structure because its outermost orbital is  $3s^2$ , which is fulfilled. Fulfilled orbital is stable, whereas Al is unstable, because its outermost orbital is  $3p^1$  which is partially filled. Partially filled orbitals are unstable.

Dr. Muhammad Javed Iqbal  
HOD Chemistry  
Asharia Colleges Rwp.

3. List the symbols of elements present in 3<sup>rd</sup> period of the periodic table. In order of increasing atomic number.

Ans  $_{11}\text{Na}, _{12}\text{Mg}, _{13}\text{Al}, _{14}\text{Si}, _{15}\text{P}, _{16}\text{S}, _{17}\text{Cl}, _{18}\text{Ar}$

- (b) Which of the above elements are:

Ans s-block elements :- Na, Mg  
p-block elements :- Al, Si, P, S, Cl, Ar

# QUICK QUIZ # 02

1. Why are cations smaller and anions bigger than parent atom?

Ans

## **CATION :**

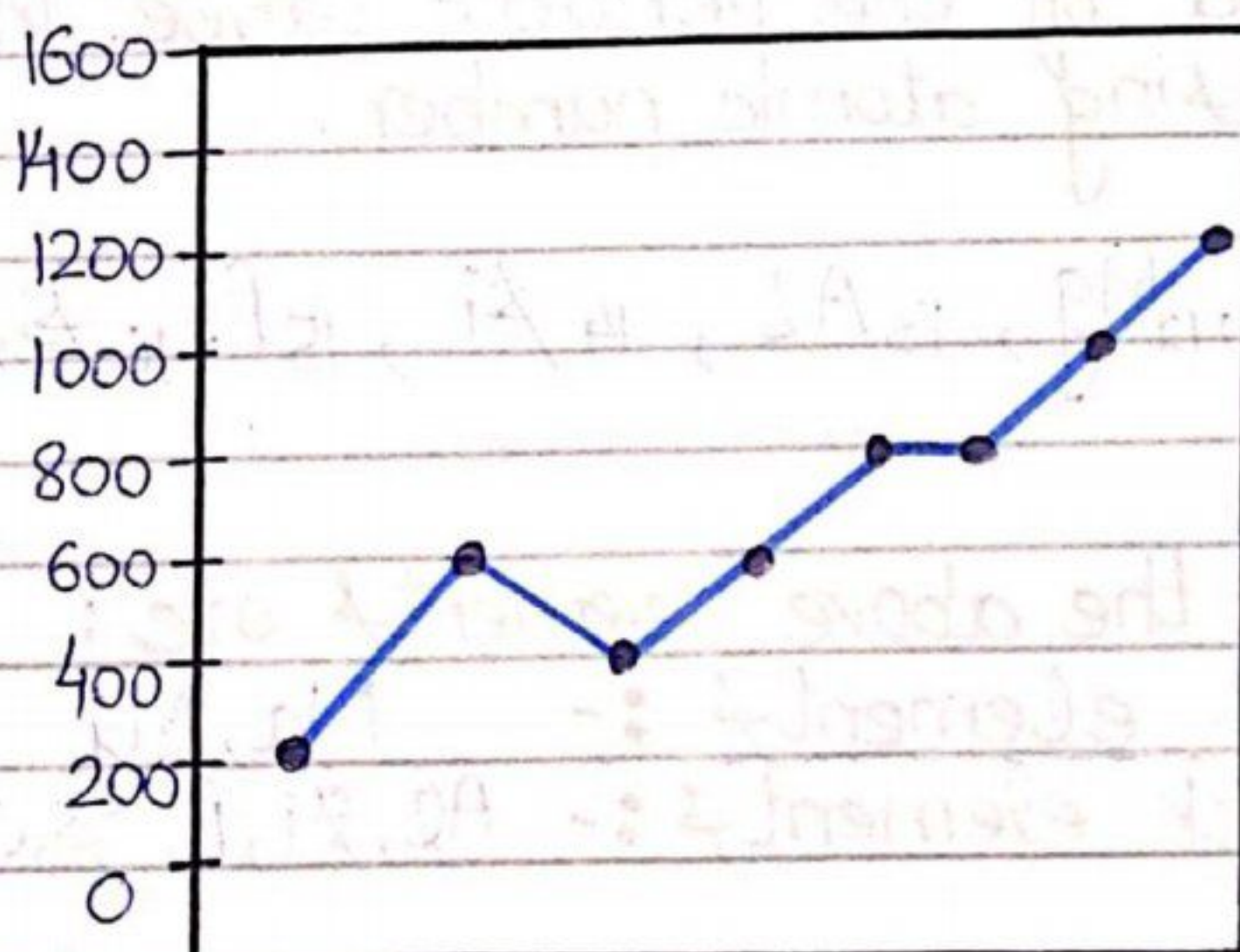
A cation is smaller in size than its parent atom because of effective nuclear charge and lesser shielding effect.

## **ANION :**

An anion is bigger in size than its parent atom because of weak effective nuclear charge and strong shielding effect.

2. Sketch or graphical representation of 3rd period element about first ionization energy & electronegativity.

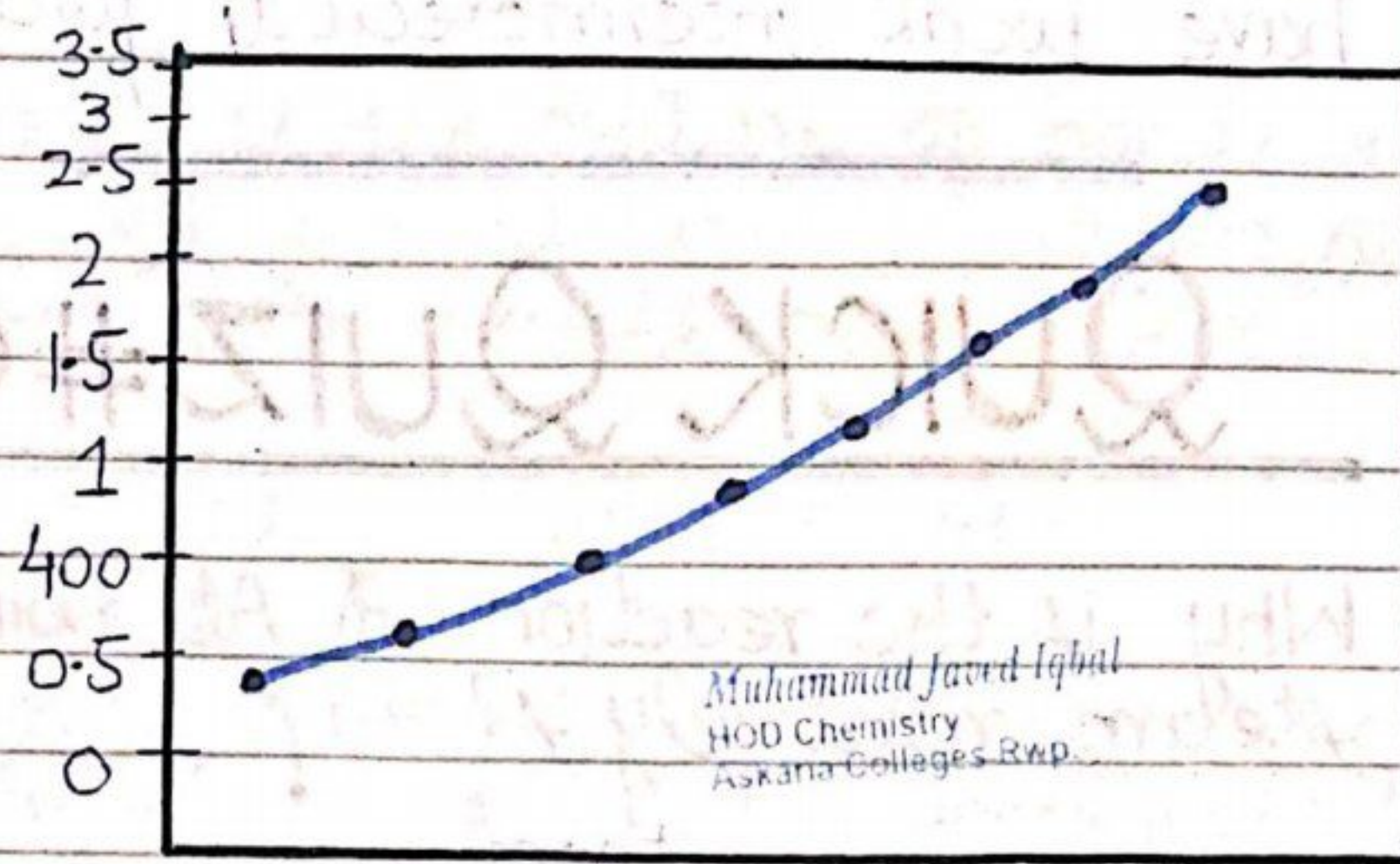
## **FIRST IONIZATION ENERGY:**



Muhammad Javed Iqbal  
HOD Chemistry  
Askaria Colleges Rwp.

Na Mg Al Si P S Cl Ar  
element

# ELECTRONEGATIVITY:



Na Mg Al Si P S Cl Ar  
element

3. Why are the trend of Melting point & Boiling point of the elements of period-3 show irregularity?

Ans

## TREND:

As we move from left to right in a period, the melting and boiling points increase upto middle i.e group - IV A and then decreases from group VA to noble gases.

## REASON:

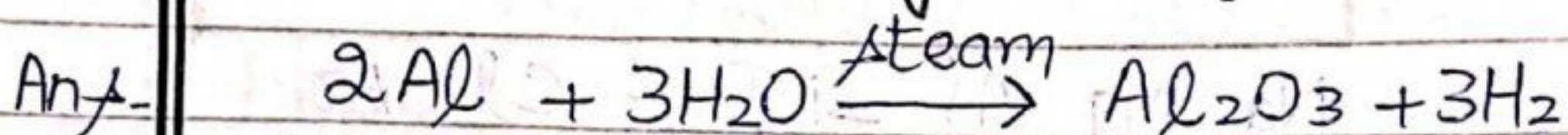
→ Melting and boiling point increases from I to IV A group because these elements (Na - Si) increasing number of binding electrons and have giant covalent structure.

→ Group V - VIII A elements (P - Ar) have low melting and boiling point because they exist in the form of diatomic molecules and

have weak intermolecular forces.

## QUICK QUIZ #03

1. Why is the reaction of Al with steam relatively slow?



Above reaction takes place when powdered Aluminium is heated with steam. The reaction gradually slows down this is due to formation of protective layer of  $\text{Al}_2\text{O}_3$  on metal, which protects further reaction.

2. What are the colours of following compounds:

$\text{MgCl}_2$  : white solid

$\text{ZnCl}_2$  : orange liquid

$\text{AlCl}_3$  : Pale yellow

$\text{PCl}_5$  : off-white solid

$\text{ICl}_4$  : colourless liquid

$\text{PCl}_3$  : colourless fuming liquid

Muhammad Javed Iqbal  
HOD Chemistry  
Acharya College Rwp.

# QUICK QUIZ #04

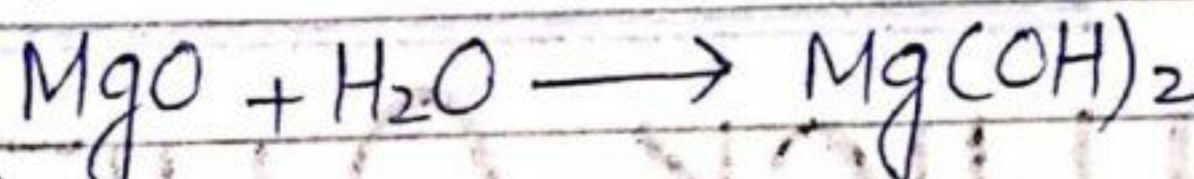
1. What is the nature of bonds in the oxides formed when Na, Mg, Al and S react with excess oxygen?

Ans:  $\text{Na}_2\text{O}$ : Ionic solid  
 $\text{MgO}$ : Ionic solid  
 $\text{Al}_2\text{O}_3$ : Ionic solid with lot of covalent character  
 $\text{SO}_3$  &  $\text{SO}_2$ : covalent compounds.

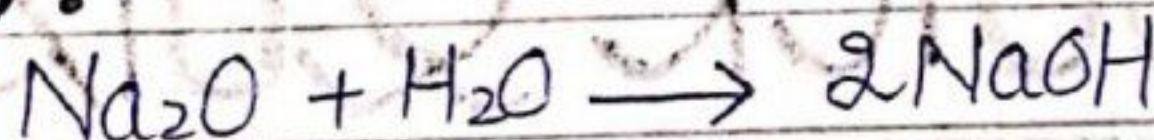
2. How do these oxides react with:

Ans: Reaction with Water: Muhammad Javed Iqbal  
HOD Chemistry  
Askaria Colleges Rwp.

$\text{MgO}$ :



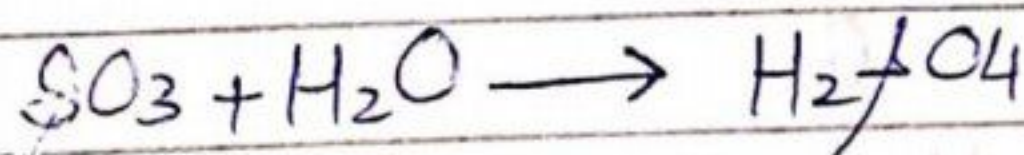
$\text{Na}_2\text{O}$ :



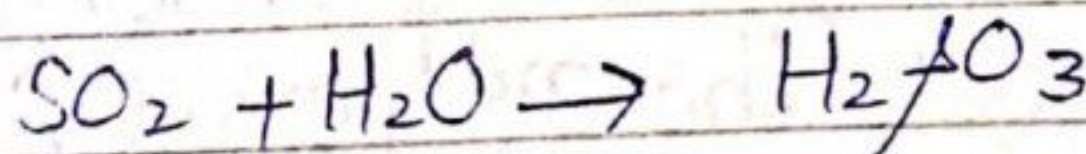
$\text{Al}_2\text{O}_3$ :

No reaction due to amphoteric nature.

$\text{SO}_3$ :



$\text{SO}_2$ :



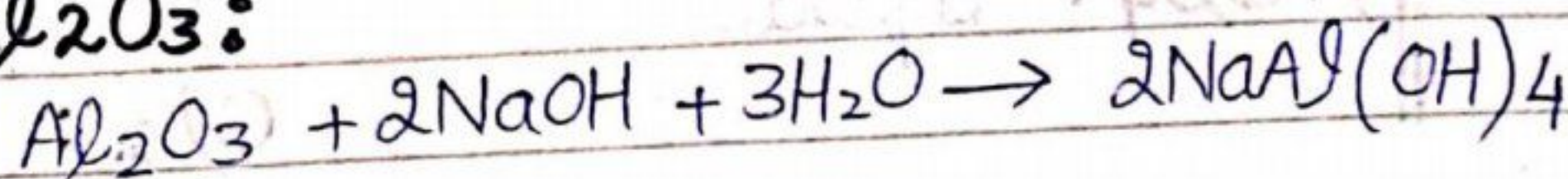
Reaction with NaOH: (dilute acid)

$\text{MgO}$ :

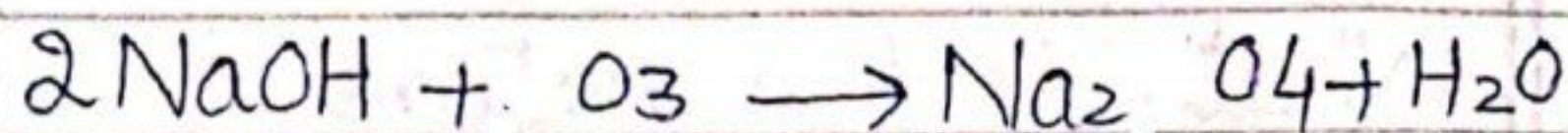
$\text{Na}_2\text{O}$ :

} No reaction because base does not react with base.

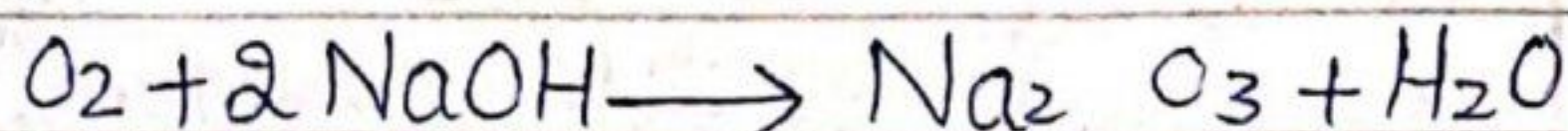
$\text{Al}_2\text{O}_3$ :



$\text{SO}_3$  :

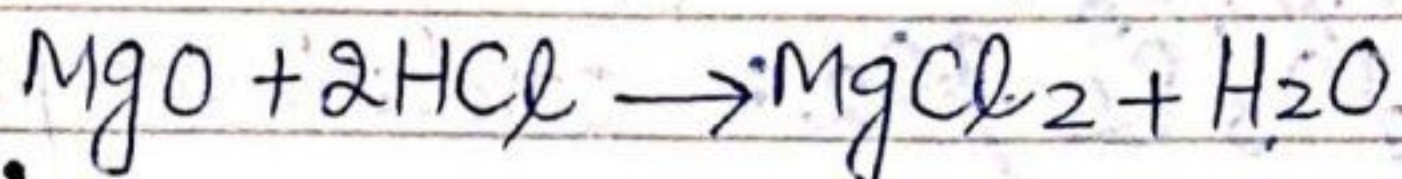


$\text{SO}_2$  :

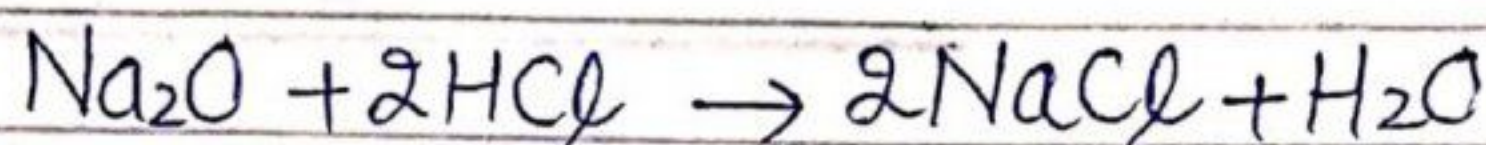


### Reaction with $\text{HCl}$ : (alkali)

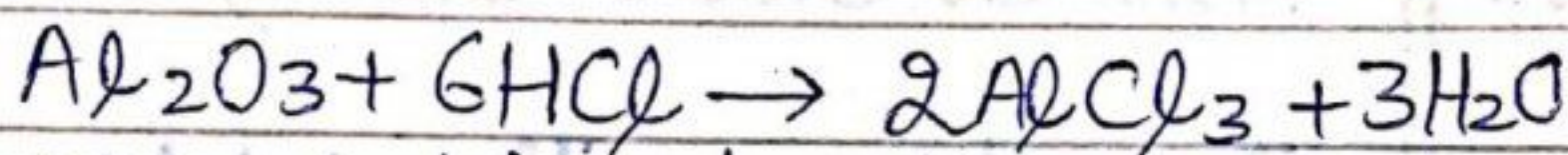
$\text{MgO}$  :



$\text{Na}_2\text{O}$  :



$\text{Al}_2\text{O}_3$  :



$\text{SO}_3$  :

} No reaction because acid

$\text{SO}_2$  :

} does not react with acid.

## QUICK QUIZ #05

A : Considering table no 13.4 and answer the following :

1. How do the states of chlorides at  $20^\circ\text{C}$  vary across the 3<sup>rd</sup> period?

State of the chloride at  $20^\circ\text{C}$  :

$\text{NaCl}$  : solid

$\text{MgCl}_2$  : solid

$\text{Al}_2\text{Cl}_6$  : liquid

$\text{SiCl}_4$  : liquid

$\text{PCl}_3(\text{PCl}_5)$  :

liquid

$\text{S}_2\text{Cl}_2$  :

liquid

$\text{Cl}_2$  :

gas

Muhammad Javed Iqbal  
HOD Chemistry  
Askaria Colleges Rwp.

2. How do the boiling points of chlorides vary across the period?

Ans

|                                          |                                      |
|------------------------------------------|--------------------------------------|
| NaCl: 1465                               | MgCl <sub>2</sub> : 1418             |
| Al <sub>2</sub> Cl <sub>6</sub> : 423    | SiCl <sub>4</sub> : 57               |
| PCl <sub>3</sub> (PCl <sub>5</sub> ): 74 | S <sub>2</sub> Cl <sub>2</sub> : 136 |
| Cl <sub>2</sub> : -35                    |                                      |

3. How do the conductivities of molten chlorides vary across the period?

Ans

|                                           |                                      |
|-------------------------------------------|--------------------------------------|
| NaCl: good                                | MgCl <sub>2</sub> : good             |
| Al <sub>2</sub> Cl <sub>6</sub> : v-poor  | SiCl <sub>4</sub> : nil              |
| PCl <sub>3</sub> (PCl <sub>5</sub> ): nil | S <sub>2</sub> Cl <sub>2</sub> : nil |
| Cl <sub>2</sub> : nil                     |                                      |

Muhammad Javed Iqbal  
HOD Chemistry  
Asharia Colleges Rwp.

B(i) Which of the following give acidic solution with water:

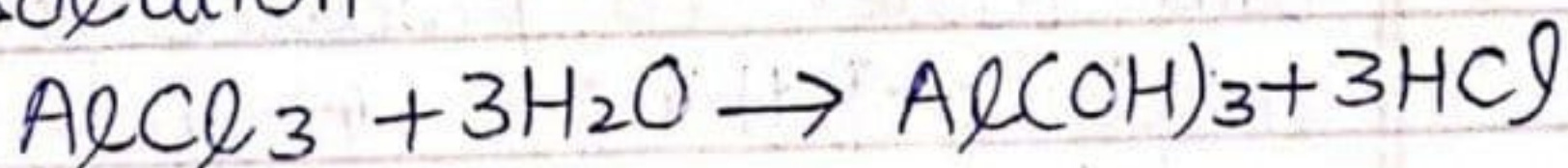
MgCl<sub>2</sub>, AlCl<sub>3</sub>: SiCl<sub>4</sub>, NaCl?

Ans

SiCl<sub>4</sub> will dissolve in excess of water

$$\text{SiCl}_4 + \text{H}_2\text{O} \rightarrow \text{SiO}_2 + 4\text{HCl}$$

AlCl<sub>3</sub> is a salt of strong acid & strong base. It reacts with water to produce acidic solution



2. Why NaCl has melting and boiling point high?

Ans NaCl is an ionic compound or an ionic

ionic solid in which ions are held together by strong ionic bonds. So lot of energy is needed to break these strong forces. Thus, it has high melting & boiling points.

3. Why  $\text{PCl}_3$  is a liquid while  $\text{PCl}_5$  is solid!

Muhammad Javed Iqbal  
HOD Chemistry  
Askaria Colleges Rwp.

Ans

$\text{PCl}_3$ :

Phosphorous trichloride is a liquid because there are only van der Waals dispersion forces and dipole dipole attraction between the molecules.

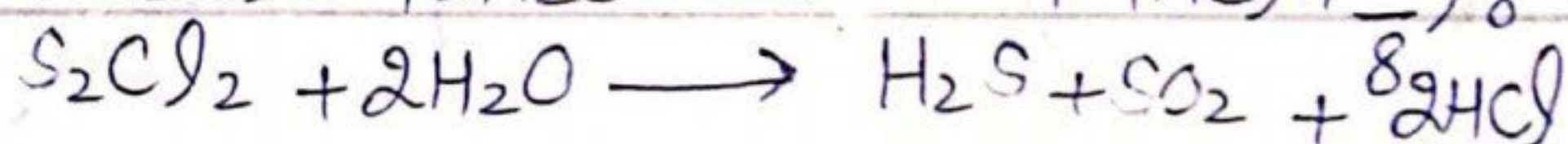
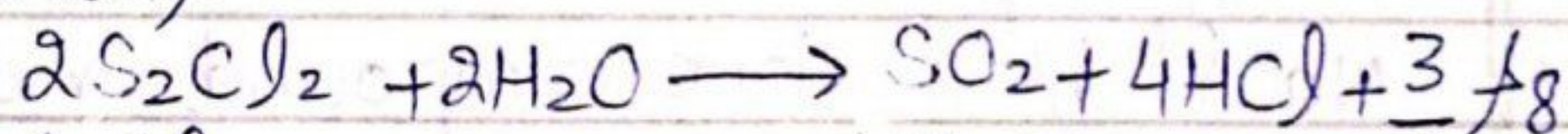
$\text{PCl}_5$ :

$\text{PCl}_5$  is a solid because it contains ions. The formation of ions contains 2 molecules of  $\text{PCl}_5$ .

4. What products are obtained on reaction of disulphur dichloride with water?

Ans

Disulphur dichloride reacts slowly with water to produce a complex mixture of things including  $\text{HCl}$ , sulphur, hydrogen sulphide acid and various sulphur containing acids and anions



5. Why  $\text{AlCl}_3$  is non-conductor in solid as well as in liquid state but  $\text{NaCl}$  and  $\text{MgCl}_2$  are conductor in liquid state and non-conductor in solid state?

Ans  $\text{NaCl}$  and  $\text{MgCl}_2$  do not conduct electricity in the solid state. It is because they do not have any mobile electrons and the ions are free to move. However they undergo electrolysis when the ions become free on melting. Solid  $\text{AlCl}_3$  does not conduct electricity because the ions are not free to move. Molten  $\text{AlCl}_3$  also does not conduct electricity because still there are no free ions.



6. Magnesium chloride is a high melting point solid, aluminium chloride is a solid which sublimes readily at about  $180^\circ\text{C}$  and silicon tetrachloride is a volatile solid. Explain the nature of chemical bonding in these chlorides and show how this accounts for the above differences in volatility.

Ans Magnesium chloride is an ionic compound. Ionic compounds have strong intermolecular forces. This is why it has high melting point.

Aluminium chloride is ionic compound with lot of covalent character. At high temperature it becomes molecular compound - so it sublimes.

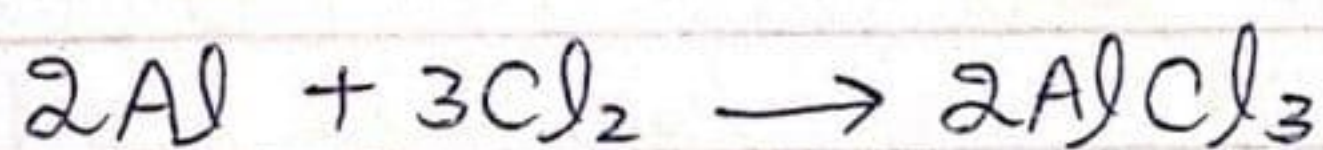
Silicon tetrachloride is a covalent chloride. There is small electronegativity difference b/w Si / Cl. So it is liquid.

2(i) Write the empirical formula of chlorides formed by element with atomic number 13.

Ans  $AlCl_3$ .

Muhammad Jared Iqbal  
HOD Chemistry  
Askaria Colleges Rwp.

(ii) Describe briefly how can we prepare a sample of this chloride?  
Sample of this chloride is prepared when powdered aluminium is heated with steam of chloride



# QUICK QUIZ #06

1. Justify that  $\text{NaOH}$  &  $\text{Mg(OH)}_2$  are basic in nature!

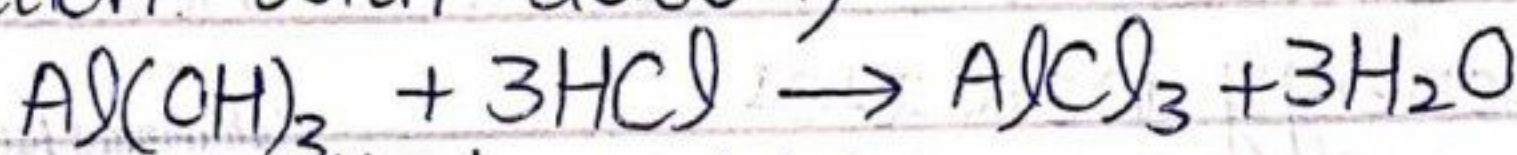
Ans. These both are basic in nature because they contain hydroxide ions which is a strong base.

Both of them react with acid to form salt

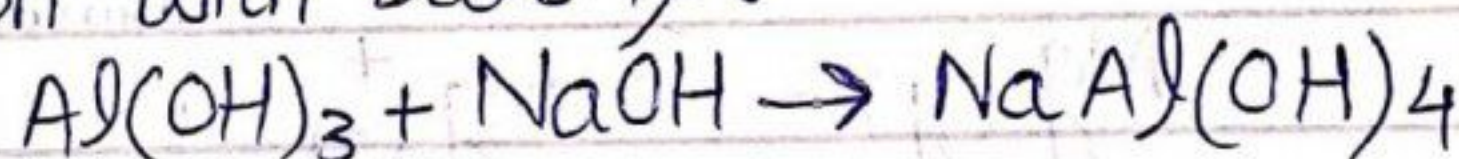
$$\text{NaOH} + \text{HCl} \rightarrow \text{NaCl} + \text{H}_2\text{O}$$
$$\text{Mg(OH)}_2 + 2\text{HCl} \rightarrow \text{MgCl}_2 + 2\text{H}_2\text{O}$$

2. Justify that  $\text{Al(OH)}_3$  is amphoteric compound!

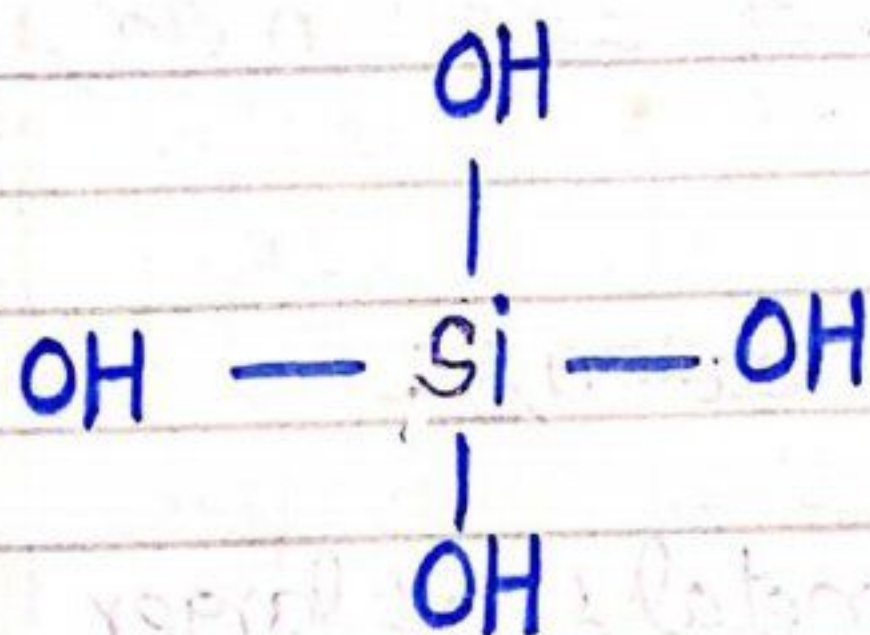
Ans. It reacts with both acids and base.  
Reaction with acid is:



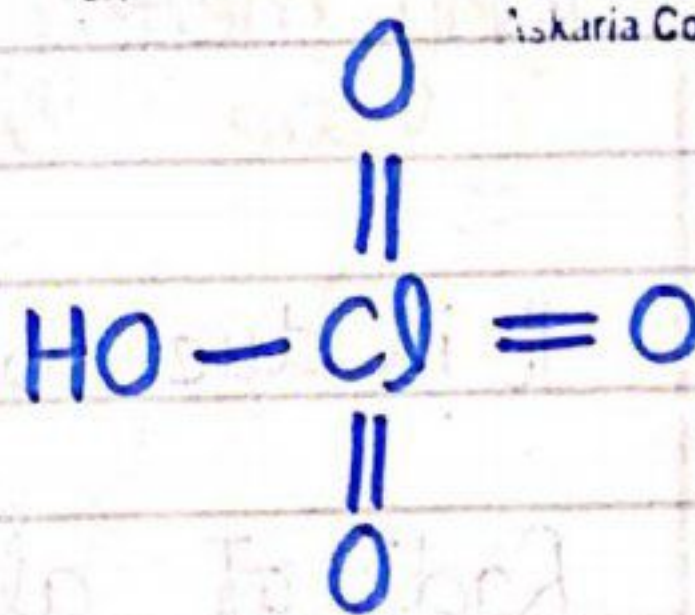
Reaction with base is:



3. Draw structures of Orthosilicic acid and chloric acid.



Orthosilicic Acid



Chloric Acid

Muhammad Javed Iqbal  
HOD Chemistry  
Askaria Colleges Rwp.

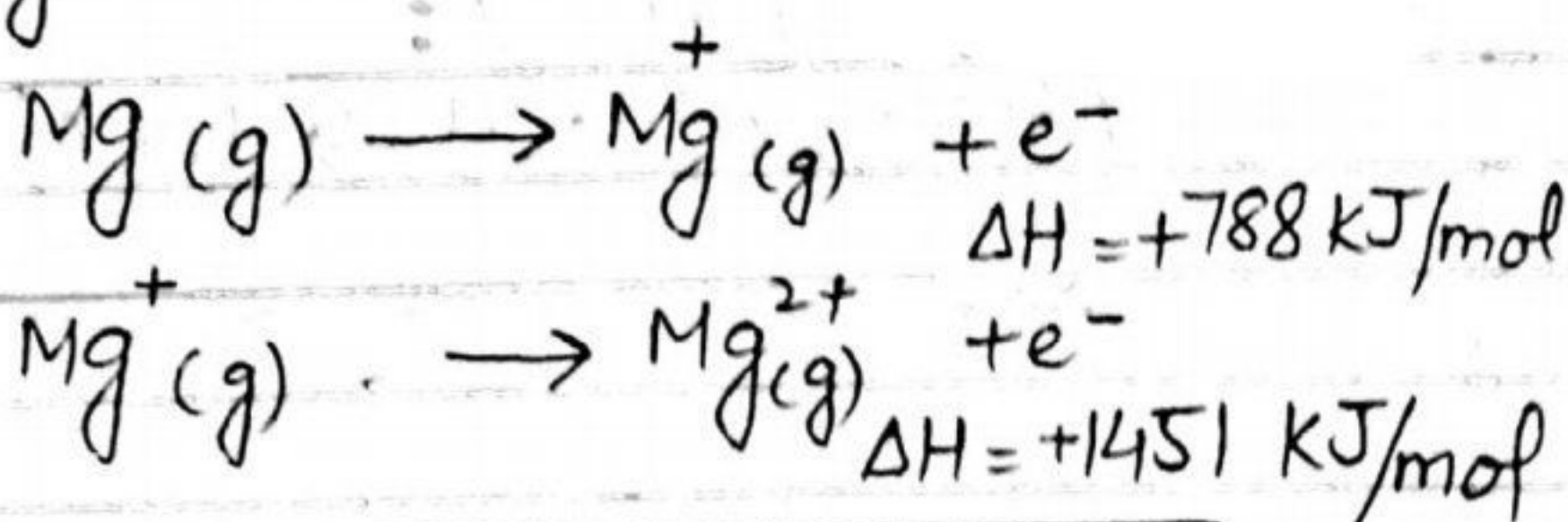
# QUICK QUIZ #07

1. Why is K lighter than Na?

Ans. K is lighter than Na which is due to an unusual increase in atomic size of K, which decreases density of K and makes it lighter than Na.

2. Explain that 2<sup>nd</sup> ionization energy is greater than 1<sup>st</sup> ionization energy?

Ans. Due to removal of 1<sup>st</sup> e<sup>-</sup>, hold of nucleus on the remaining electron increases, Hence, second electron is difficult to remove and thus ionization energy increases.



3. Why melting point of alkali metals are low?

Ans. It is due to 2 reasons:

1. Radii of alkali metals is larger and there is loose packing.

2. It also because alkali metals have less binding electrons i.e. 1 valence e<sup>-</sup>.

# QUICK QUIZ #08

1. Why lithium salts are more covalent in nature while salts of other alkali metals are ionic?

Ans According to Fajan's rule

"Smaller the cation, greater is the amount of covalent character in its compound."

Here size of alkali metal is smaller than alkali metal, that's why its salt is more covalent in nature.

2. Give trend of stability of carbonates of alkali metal along the group.

Ans Stability of alkali metal carbonates increases down the group due to increase in ionic character and Lattice energy of resulting oxide.

3. Why are alkali-metals stores in kerosene/paraffin oil.

Ans Alkali-metals react with  $O_2$  or in air, rapidly and thus get tarnished due to the formation of their oxide on surface. They also react very fast with water vapours present in the air.

# QUICK QUIZ #09

1. Justify the placing of Li, Na, K, Rb & Cs in the same group of periodic table.

Ans They are placed in same group of periodic table, because they have same no of  $e^-$  in their valence shell.

2. Write the electronic configuration for alkali metal atoms.

Muhammad Javed Iqbal  
HOD Chemistry  
Azkaria Colleges Rwp.

Ans

$3\text{Li} : 1s^2, 2s^1$   
 $11\text{Na} : 1s^2, 2s^2 2p^6, 3s^1$   
 $19\text{K} : 1s^2, 2s^2 2p^6, 3s^2 3p^6, 4s^1$   
 $37\text{Rb} : 1s^2, 2s^2 2p^6, 3s^2 3p^6, 4s^2, 3d^{10}, 4p^6, 5s^1$   
 $55\text{Cs} : 1s^2, 2s^2 2p^6, 3s^2 3p^6, 4s^2, 3d^{10}, 4p^6, 5s^2, 4d^{10}, 5p^6, 6s^1$   
 $87\text{Fr} : 1s^2, 2s^2 2p^6, 3s^2, 3p^6, 4s^2, 3d^{10}, 4p^6, 5s^2, 4d^{10}, 5p^6, 6s^2, 4f^{14}, 5d^{10}, 6p^6, 7s^1$

3. Explain the periodicity in :-

Ans **Ionization energy / Atomic Radii :**

→ Atomic radii increases from Li to Rb, due to increase in number of shells and shielding effect.

→ Ionization energy decreases from Li to Rb due to increase in size

## → Electronegativity:

Electronegativity decreases from Li to Rb due to increase in size.

### 3. Explain the following:

a. Alkali metals show an oxidation state +1 only.

Because they have only  $1e^-$  in their valence shell which they lose and get +1 oxidation state and achieve noble gas configuration.

b. Alkali metals are univalent.

Because they have  $1e^-$  in their valence shell which they lose and achieve noble gas configuration. It becomes very difficult to remove 2nd  $e^-$ , that's why they are univalent.

c. Alkali metals are good reducing agents.

Because they have low ionization energy they easily lose  $e^-$  i.e. they are easily oxidized, and act as excellent reducing agents.

d. Alkali metals have low melting points.

Because they have 1 valence  $e^-$  so they have weaker binding due to  $1e^-$  for binding thus they have low melting point loose packing due to large size.

e. Alkali metals give characteristic colour to bunsen flame.

In alkali metals the outer  $e^-$  ( $ns^1$ ) is loosely held with nucleus which is easily excited to higher energy level even by absorbing less energy. When this  $e^-$  comes back to its original position. It gives out absorbed energy in the form of light in visible region.

f. Na is stored under Kerosene.

Na reacts with  $O_2$  air rapidly and get tarnished due to formation of oxide on its surface. It also reacts with water vapour in air. To prevent this reaction it is stored in Kerosene.

g. Alkali metal forms  $M^+$  cations instead of  $M^{+2}$  cations.

This is because they have 1  $e^-$  in their valence shell which they loose and get  $M^+$  charge and also achieve noble gas electronic configuration. After that it become difficult for them to lose another  $e^-$ . That's why they do not form  $M^{2+}$  cation.

h. Alkali metals have low ionisation potentials.

Alkali metals have larger size than other atoms in the same period. So their

outermost  $e^-$  are loosely held with the nucleus and can be removed easily  
Hence they have low ionisation energy

# QUICK QUIZ #10

1. Among the alkaline earth metals, which atom has the highest ionization potential?

Ans: Beryllium, because it has the smallest size.

2. Explain why Ca, Sr, Ba & Ra are placed in the same group of the periodic table.

Ans: Due to similar no. of  $e^-$  in valence shell, they show same chemical properties, so they are placed in the same group.

3. Explain the following:-

a. Alkaline earth metals form  $M^{2+}$  ions but not  $M^+$  ions.

It is because they have 2 valence  $e^-$ . Both these  $e^-$  have quite low ionization energy.

Muhammad Javed Iqbal  
HOD Chemistry  
Ashrafia Colleges Rwp.

Muhammad Javed Iqbal  
HOD Chemistry  
Ashrafia Colleges Rwp.

(b) Although the value of 2<sup>nd</sup> ionization potential of alkaline earth metals is higher than that of 1<sup>st</sup> ionization potential yet these metals form  $M^{2+}$  ions instead of  $M^{+}$  ions -

It is because, by the removal of both electrons, the alkaline earth metal get the configuration of the noble gas. Hence they form  $M^{2+}$  ions instead of  $M^{+}$  ions -

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(c) Beryllium salts have never more than four molecules of water of crystallization -

In case of  $\text{Be}^{2+}$  ion - there are only four orbitals (namely one orbital) can accept lone pairs of electrons denoted by O-atom on each of the water molecules -

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(d) - The Solubility of the Sulphates of alkaline earth metals decreases whereas the Solubility of their hydroxides increases on moving down the group?

In hydroxides,  $\text{OH}^-$  is a small anion. So, lattice energy depends upon the size of cations of alkaline earth metals only. Here lattice energy overcomes the hydration energy. The size of cations increases down the group. So the lattice energy decreases and therefore the solubility of hydroxides increases. In sulphate  $\text{SO}_4^{2-}$  ion is common which is a quite bigger anion.

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(e) The thermal stability of carbonates of alkaline earth metals increases in atomic numbers -

The carbonates decompose as  $\text{MCO}_3 \rightarrow \text{MO} + \text{CO}_2$ .  
Down the group metal size increases, thus lattice energy of resulting oxide decreases, hence its stability decreases -

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(7) Alkaline earth metals salts impart colour to the Bunsen flame -

Answer of Q2 part (vii)

(g)  $\text{MgSO}_4$  is more soluble in water than  $\text{BaSO}_4$

It is because the  $\text{SO}_4^{2-}$  ion is common for both. This ion is a quite bigger anion. Hence hydration energy overcome the lattice energy. Since size of  $\text{Ba}^{2+}$  ion is greater than that of  $\text{Mg}^{2+}$  ion. So hydration energy of  $\text{Ba}^{2+}$  ion is less than  $\text{Mg}^{2+}$  ion.

(h) Alkaline earth metals form  $\text{M}^{2+}$  ions but not  $\text{M}^{3+}$  ions

Ans - It is because, alkaline earth metals have two valence electrons. By the removal of both electrons the alkaline earth metal get the configuration of noble gas and thus they form  $\text{M}^{2+}$  ions -

• It become very difficult to remove the third electron from noble gas configuration ions -

(4) How do the elements of group IIA differ from alkali metals?

See Pg part (xi)

(5) (ii) The hydroxides of group IIA metals are weaker than those of group IA metals -

Ans - The Group IIA metals have smaller size than group IA metals - Due to smaller size, the packing of their ions is quite tight in their crystal lattice. Moreover, the cations of group-II metals are divalent ( $M^{2+}$ ) which show more attraction for hydroxide anions. Hence they have high lattice energies. Hence their ionization is lesser and therefore they are weaker base than those of group IA metals -

(j) The carbonates of group IIA metals are less stable to heat than those of group IA metals -

Ans - The carbonates decompose as  $MCO_3 \rightarrow MO + CO_2$  - In case of small size ions, the lattice energy of the resulting oxide increases. In case of large cations, the lattice energy of the resulting oxide is relatively much less and the decomposition is difficult. Since alkaline earth metals have smaller size, therefore their carbonates are less stable because they are decomposed easily -

(K) KOH is stronger base than  $\text{Ba(OH)}_2$

KOH is completely dissociated in water thus giving higher concentration of  $\text{OH}^-$  ions than  $\text{Ba(OH)}_2$

## Quick Quiz # 11

01 why tin melting point is low as compared to lead?

Ans The melting point of tin is less than lead. It is due to forming a distorted 1,2-coordinated structure rather than a pure structure.

02 Give trend of conductivity 4<sup>th</sup> group element?

Ans- The electrical conductivity increases down the group from typically non-metallic conductivity.

behavior of carbon as diamond to the typically metallic behaviour of white tin and lead

Q3 which of the following metals are semiconductors  
Pb, C, Si, Ge.

Ans - Si and Ge are semiconductors



Q4 - Arrange following cations in increasing order of their stability -  $\text{Sn}^{4+}$ ,  $\text{Sn}^{2+}$ ,  $\text{Ge}^{2+}$ ,  $\text{Pb}^{2+}$

Ans - (Most stable)  $\text{Ge}^{4+} > \text{Pb}^{2+} > \text{Sn}^{4+} > \text{Sn}^{2+}$  (Least stable)

## Quiz Quiz # 12

(1) Give the following reason -

- HI is stronger acid than HF

Ans (i) HI is stronger acid than HF because the bond energy of H-F bond is considerably greater than H-I bond. Thus HF cannot donate its  $H^+$  ions easily -

(ii) The conjugate base of HF is  $F^-$  ion which is a stronger base than  $I^-$  ion. Thus its corresponding acid HF will be weaker than HI

(iii) Hence, HI is stronger acid than HF -

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- Although H-bonding in HF is stronger than that in  $H_2O$ ,  $H_2O$  has much higher b.pt -

Ans- It is because, HF can make one hydrogen bond per molecule while water can make two hydrogen bond per molecules - So due to strong hydrogen bonding in water, it has higher boiling

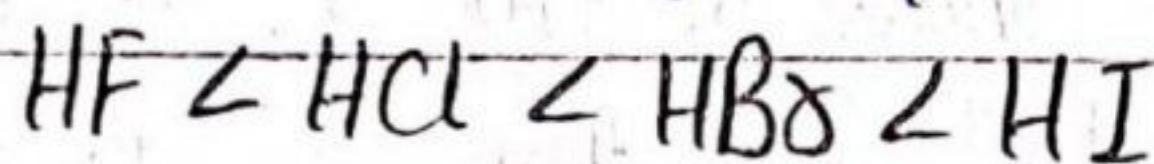
point than HF -

- The acidic character of hydrides of VIIA elements increases on decreasing the group -

Ans (1) It is because down the group bond energy of H-X bond decreases, so the ease of donation of proton increases -

(2) The order of basicity of their conjugate bases is  $F^- > Cl^- > Br^- > I^-$  - Strongest conjugate base means a weaker acid -

The order of acidity of HX acid is



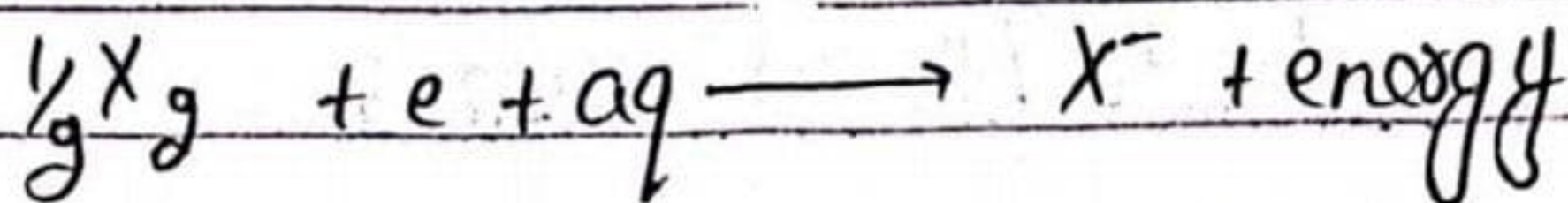
Hence acidity increases down the group -

(2) Illustrate the oxidising properties of halogens by giving example of two typical reactions -

Ans- A substance that has a tendency to accept one or more electrons is said to show oxidizing property -

The halogens have high electron affinity values and high hydration energy value of

their ions - They have great tendency to accept electron and hence acts as strong oxidizing agent - This property is represented as

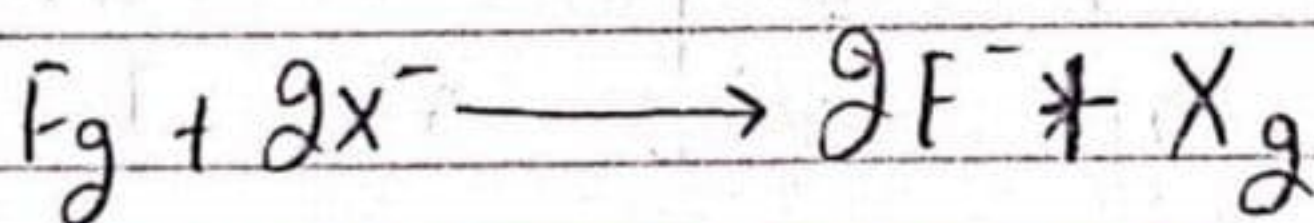


- During this reaction, energy is released - The values of energy decreases from  $E_g$  to  $I_g$  - Thus the oxidizing power of halogens also decreases in the same direction -

Examples -

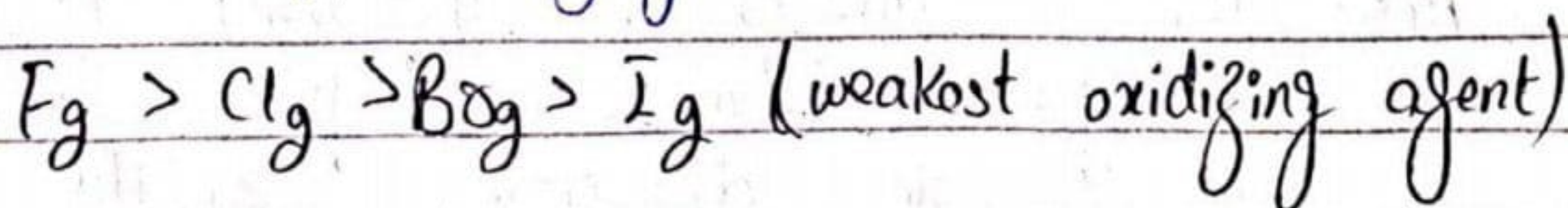


- $F_2$  displaces other halogens from their corresponding halides -



- (3) Arrange the halogens in the decreasing order of their oxidising power -

Ans - The order of oxidizing power is



(4) Give reason of the following;

(a) Chloride is stronger oxidizing agent than iodine -

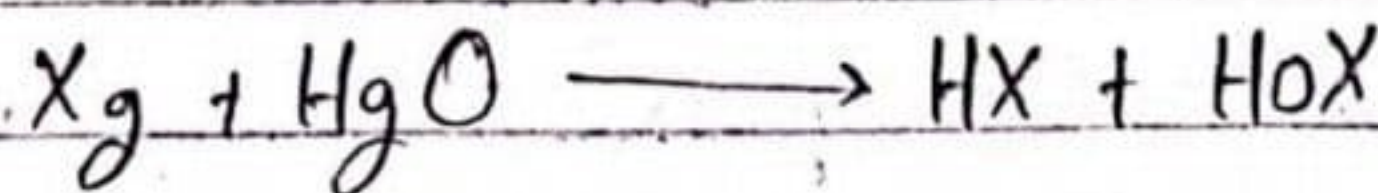
Ans. It is due to following reason;

- The electron affinity of  $\text{Cl}^-$  is higher than that of iodine, so Cl will take up electron readily -

(b) Halogens are the best oxidising agent -

Ans - The halogens have high electron affinity values and also high hydration energy values of their ions. They have great tendency to accept electron to form anions and acts as strong oxidizing agent -

e.g;



(c) Fluorine is a better oxidizing than chlorine -

Ans - This is due to that the bond dissociation energy of fluorine is quite low, so it will dissociates rapidly to take up electrons -

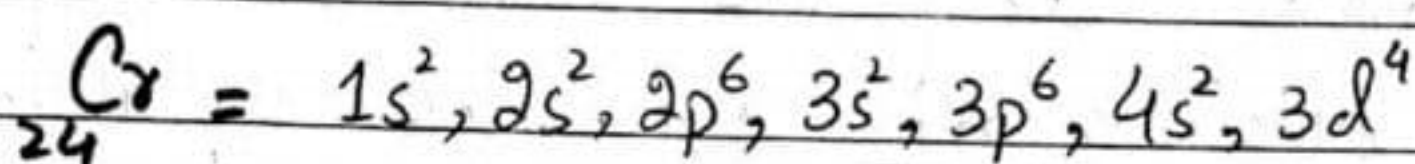
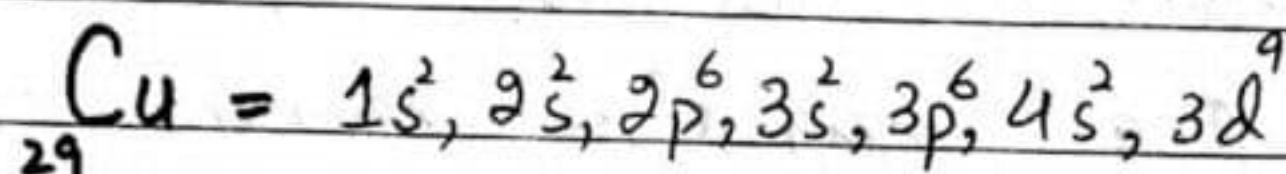
(d) Electronegativity of halogens decreases in order  $\text{F} > \text{Cl} > \text{Br} > \text{I}$

Ans - It is due to increase in size of halogens down the group -

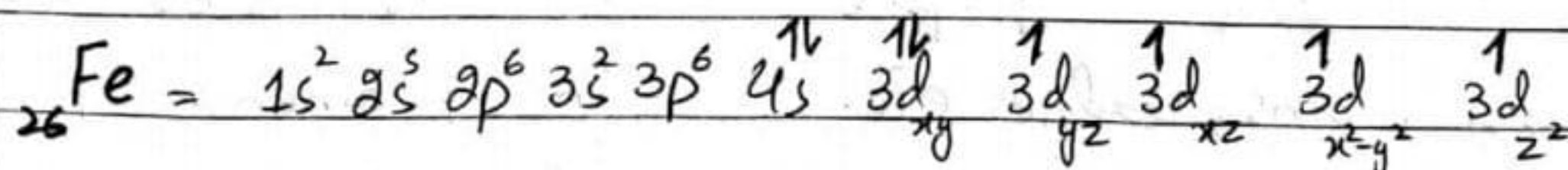
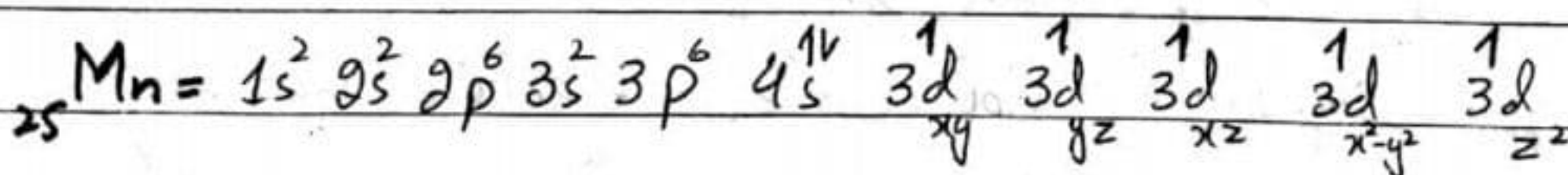
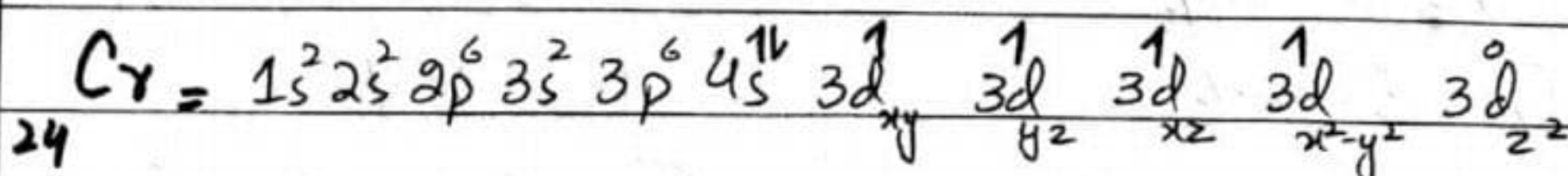
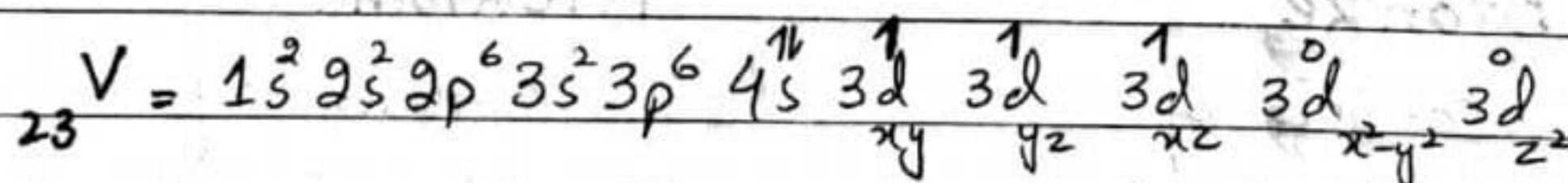
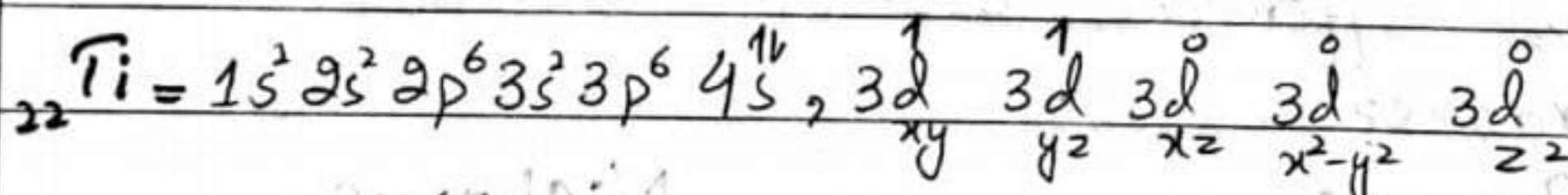
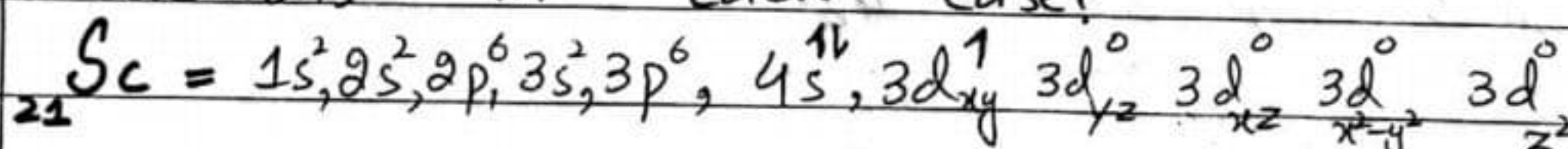
- Due to increase in size, the distance of bonding pairs increases from the nucleus of an atom. However bonding pairs are less strongly attracted and so the electronegativity decreases -

UNIT # 14
d and f-Block Elements  
Transition Elements
Quick Quiz # 1

1. Give the electronic configuration of elements copper (Cu) and chromium (Cr)?

Ans

2. Write the general state electronic configuration (s, p, d, f) of the elements of the first transition series (Z=21 to 30) indicating the number of unpaired electrons in each case?

Ans



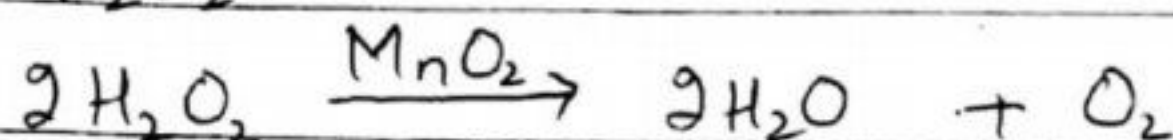
3. Name the catalyst used for

i) Decomposition of  $H_2O_2$

ii) Manufacturing of  $CH_3OH$ .

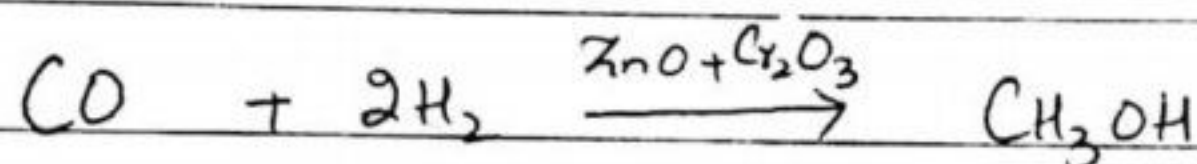
Ans i) Decomposition of  $H_2O_2$ :-

Manganese (IV) oxide ( $MnO_2$ ) is used as a catalyst for decomposition of  $H_2O_2$ .



ii) Manufacturing of  $CH_3OH$ :-

A mixture of  $ZnO$  and  $Cr_2O_3$  is used for manufacture of methyl alcohol.



4. Why Transition element shows variable oxidation state?

Ans They show variable oxidation state because they have d-electrons in addition to s-electron for bond formation. These elements have several  $(n-1)d$  and  $ns$  electrons. The energies of  $(n-1)d$  and  $ns$  orbitals are very close to each other. The  $(n-1)d$  electrons are as easily lost as  $ns$  electrons. Thus, they show variable oxidation states.

Date: \_\_\_\_\_

5. Which property of Transition elements enable them to serve as catalyst?

Ans It is due to following reasons

\* The reason is that the transition metals show variety of oxidation states. In this way, they can form intermediate products with various reactions.

\* They also form interstitial compounds which can absorb an activator to the reacting species.

6. Why alloys are harder as compared to the constituent metal?

Ans Alloy is mixture of two or more than two metals. Transition metal form alloys with each other.

Transition elements have almost similar sizes and atoms of one metal can easily take up positions in crystal lattice of other. They form substitutional alloys among

themselves. That's why alloys are harder as compared to the constituent metal.

7. What do you understand by magnetic properties of Transition elements?

Ans Paramagnetism:-

The compounds attracted into the magnetic field are called

paramagnetic and the phenomenon is called paramagnetism.

It is due to unpaired electrons present in metals and their compounds.  
e.g

$Mn^{+2}$ ,  $Fe^{+2}$  etc

Diamagnetism:-

The compounds which are slightly repelled by magnetic field are called diamagnetic and phenomenon is called diamagnetism.

Substances in which even number of electrons are present, and have paired spins are diamagnetic.

e.g

$Zn^{+2}$ ,  $Sc^{+3}$  etc.

Ferromagnetism:-

The substances which can be magnetized are called ferromagnetic and the phenomenon is called ferromagnetism.

e.g

Fe, Co, Ni etc.

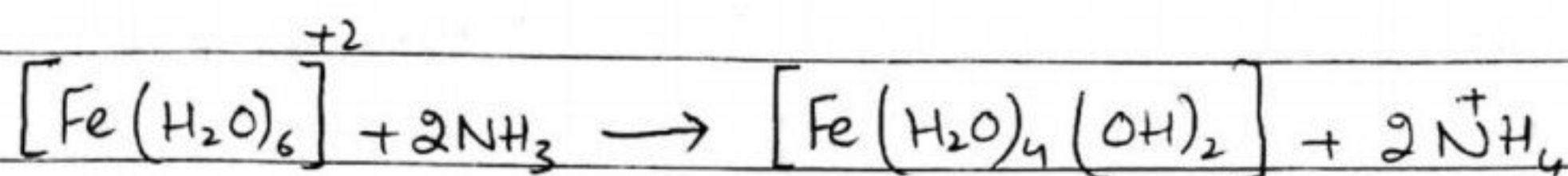
Quick Quiz # 3

1. Give role of ammonia in reaction of it with iron ion solution?

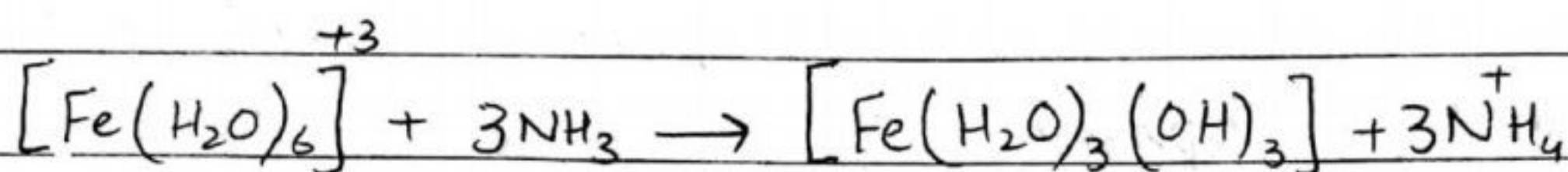
Ans Ammonia can act both as base and a ligand. However, with iron it

Simply acts as a base. Thus, it removes hydrogen ions from the aqua complexes of iron.

In The Fe(II) case:-



In The Fe III case:-



2. In which form iron ion are present in aqueous solution?

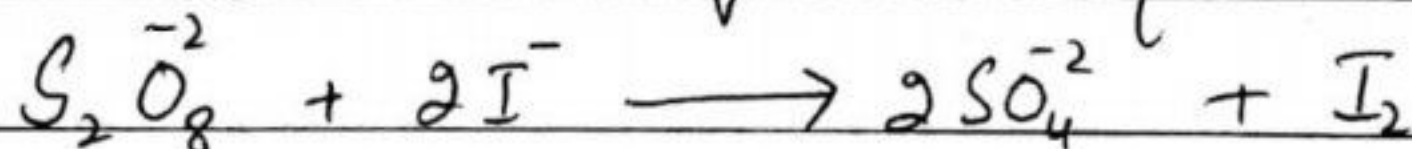
Ans Iron exists in aqueous solution as aqua complexes. These are

\* Hexaqua Iron (II) ion  $[\text{Fe}(\text{H}_2\text{O})_6]^{+2}$

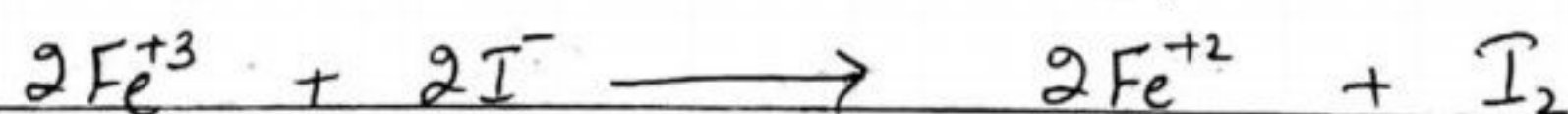
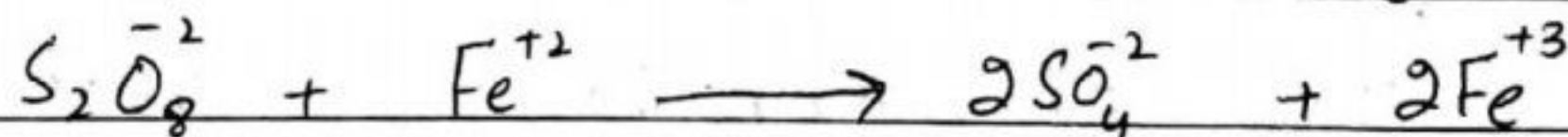
\* Hexaqua Iron (III) ion  $[\text{Fe}(\text{H}_2\text{O})_6]^{+3}$

3. Explain catalytic role of iron in reaction between persulphate ion and iodide ion?

Ans The overall equation for reaction is



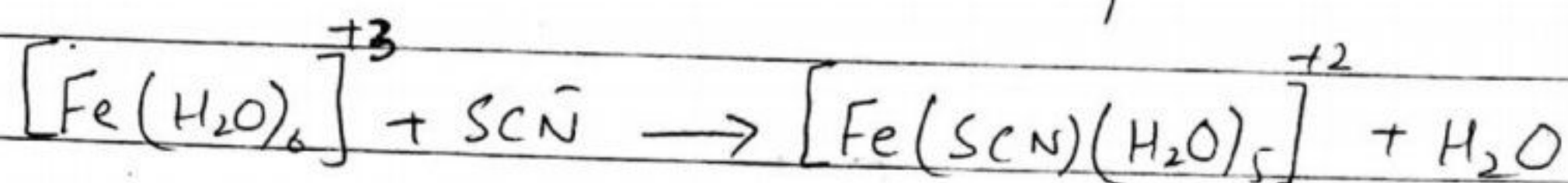
\* This reaction can be catalyzed by iron ions. The reaction occurs in two stages



\* If iron (III) ions are used then second of these reactions occur first.

4. How Thiocyanate ion is used for testing of Fe?

Ans If Thiocyanate ions  $\text{SCN}^-$  ions are added to a solution containing Iron III ions, an intense blood red solution containing the ion  $[\text{Fe}(\text{SCN})(\text{H}_2\text{O})_5]^{+2}$  is formed.

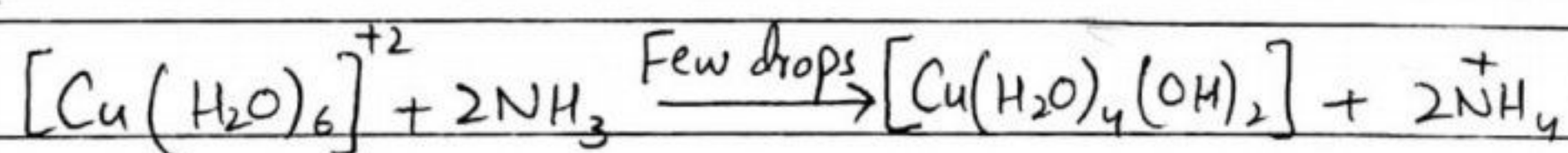


$\text{SCN}^-$  ions are added as sodium or potassium or ammonium Thiocyanate solution.

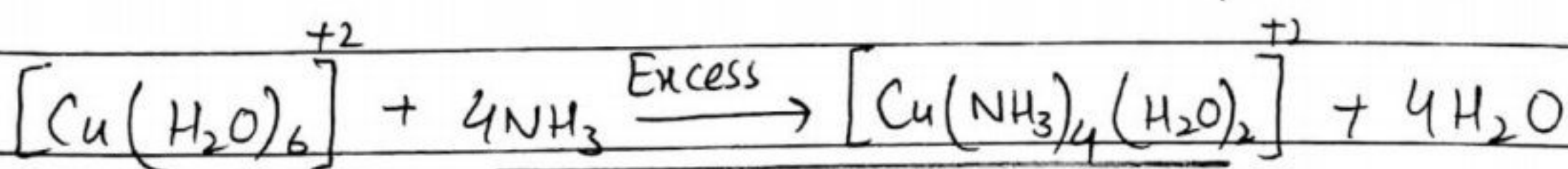
### Quick Quiz # 4

1. Ammonia acts as base as well as ligand. Prove above statement by reaction with copper ion?

Ans With a small amount of ammonia, hydrogen ions are pulled off the hexaqua ion to give the neutral complex. This is insoluble and precipitates are formed. Here ammonia is acting as base.



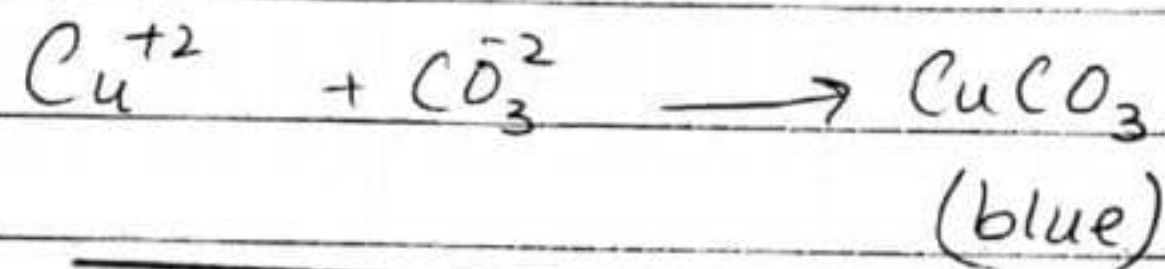
\* By adding excess of ammonia, the ammonia replaces water as a ligand.



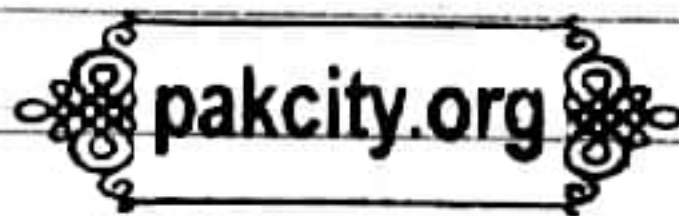
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2. When copper ions react with carbonate what will you expect. Which types of precipitate are formed?

Ans The precipitates of copper(II) carbonate are obtained which are blue in colour.



← End →



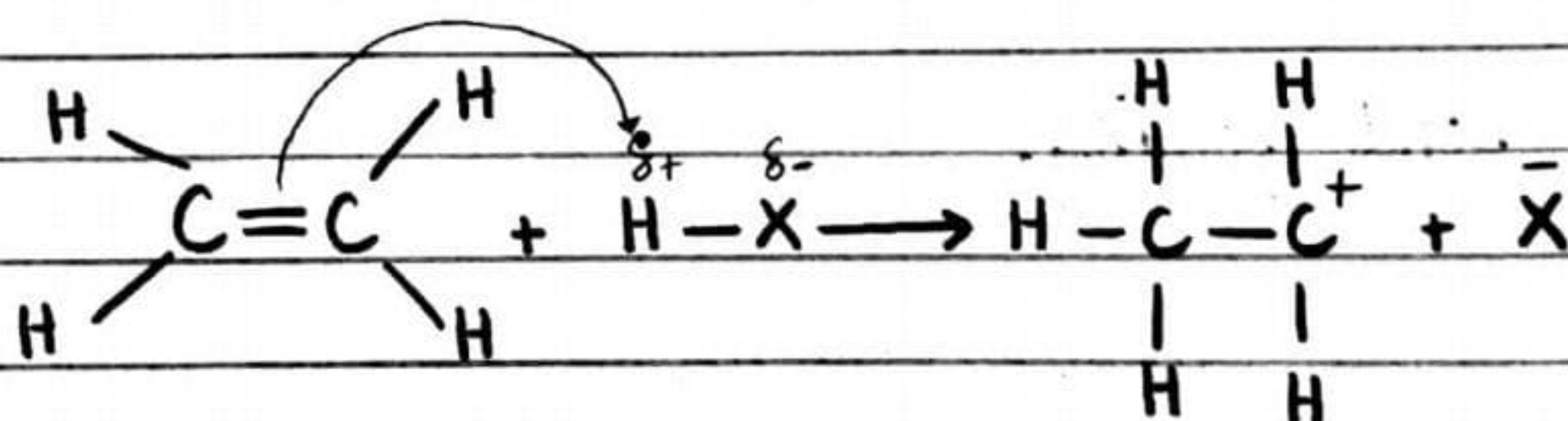
# "QUICK QUIZ"

## "CHAPTER NO # 17"

### "QUICK QUIZ # 01"

1. What is Carbonium Ion?

A carbonium ion is a reaction intermediate. It is a trivalent with a positive charge on carbon atom. It can be produced as follows:



Carbonium Ion

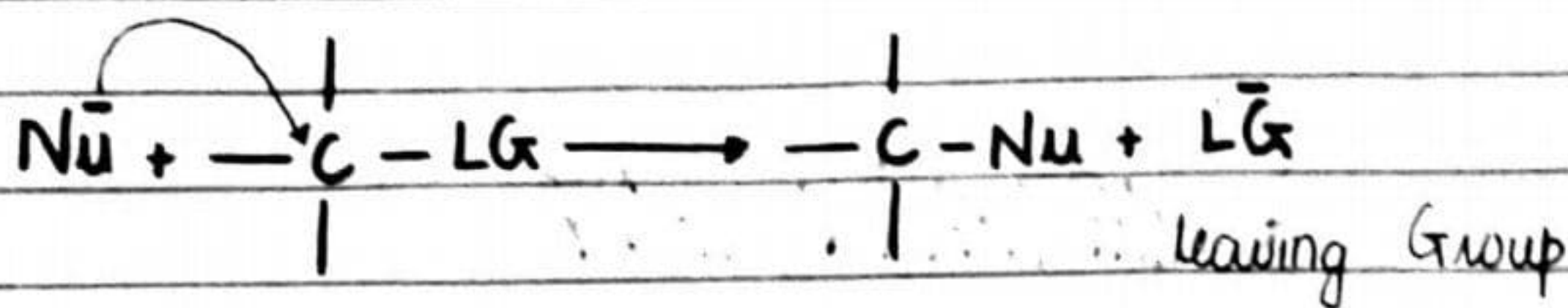
Another term use for such species is called carbocation.

2. What is leaving Group?

Group which depart from the molecule during substitution reaction is called leaving group. It is also called nucleophile.

The incoming nucleophile must be stronger than the

leaving group. Iodide ( $I^-$ ) is a good leaving group as well as a good nucleophile.



"TABLE"

|           |                            |
|-----------|----------------------------|
| EXCELLENT | $CH_3-C_6H_4-SO_2NH_2$     |
| VERY GOOD | $I^-$ , $H_2O$             |
| GOOD      | $Br^-$                     |
| FAIR      | $Cl^-$                     |
| POOR      | $F^-$                      |
| VERY POOR | $HO^-$ , $NH_2^-$ , $RO^-$ |



### 3- Define bond polarity.

Electronegativity difference between two bonded atom is called bond polarity. Higher will be the bond polarity higher will be the reactivity and vice versa.

Example:

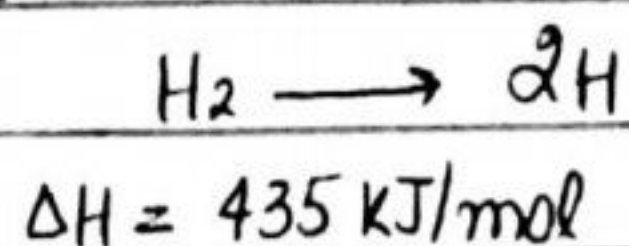
The bond between H and Cl is polar due to electronegativity difference between  $H^+$  and  $Cl^-$ .

### 4- Define bond energy.

Amount of energy required to break 1 mole of

bond is called bond energy. Less will be the bond energy, higher will be the reactivity and vice versa.

Example:

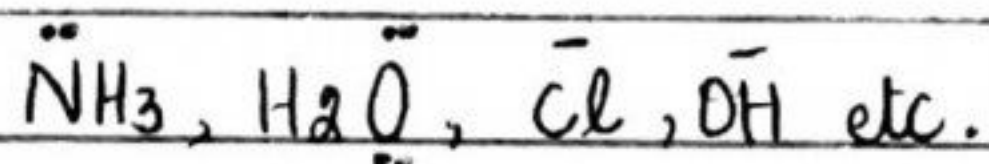


Thus, bond energy of H-H bond is 435 kJ/mol.

5- What is nucleophile?

Nucleophile means nucleus loving. Substance which is electron rich is called nucleophile. It may be neutral or negatively charged.

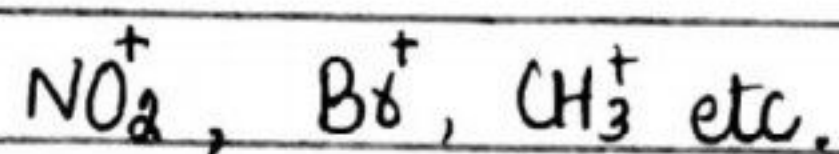
Example:



6- What is electrophile?

Substance which is electron deficient is called an electrophile or specie in search of negative charge is called electrophile. It is positively charged.

Example:

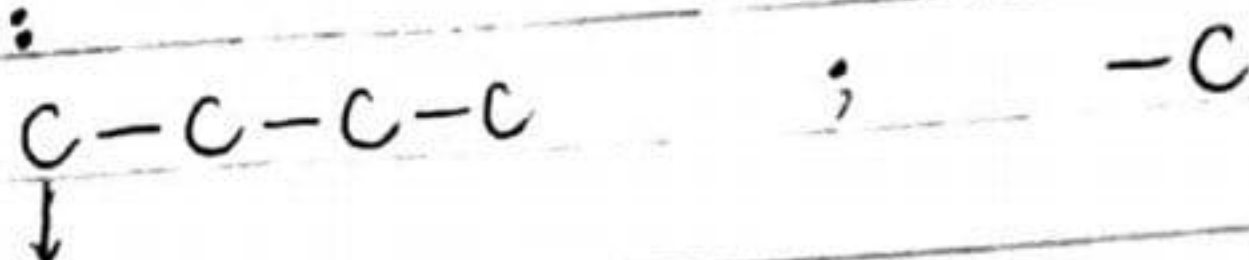


7- What are primary, secondary and tertiary carbon atom?

## → PRIMARY CARBON ATOM:

The carbon atom which is directly bonded with one carbon atom or no carbon atom is called primary carbon atom.

Example:

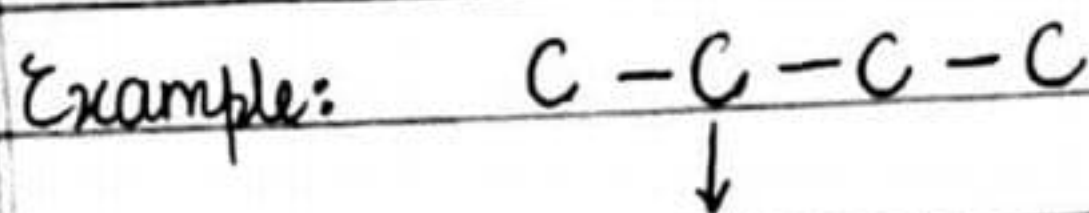


Primary C-atom ( $1^\circ$ -C-atom)



## → SECONDARY CARBON ATOM:

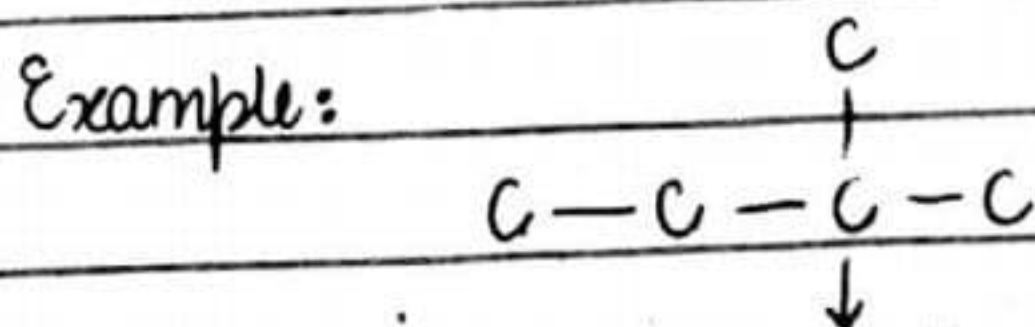
The carbon atom which is directly bonded with two carbon atoms is called secondary carbon atom.



Secondary C-atom ( $2^\circ$ -C-atom)

## → TERTIARY CARBON ATOM:

The carbon atom which is directly bonded with three carbon atoms is called tertiary carbon atom.



Tertiary carbon atom ( $3^\circ$ -C-atom)

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# "QUICK QUIZ # 02"

1- What are organometallic compounds?

The compound containing at least one bond between carbon atom of organic compound and a metal atom are called organometallic compounds.

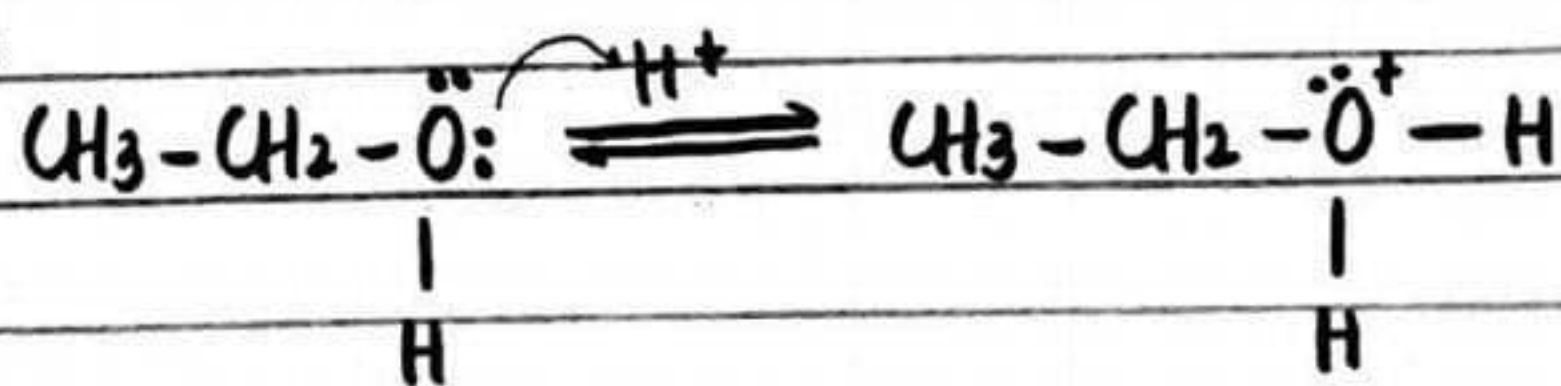
Examples:

- \* Grignard's Reagent:  $\text{CH}_3 - \text{Mg} - \text{Cl}$
- \* Alkyl Lithium compounds:  $\text{CH}_3 - \text{Li}$

2- Define protonation.

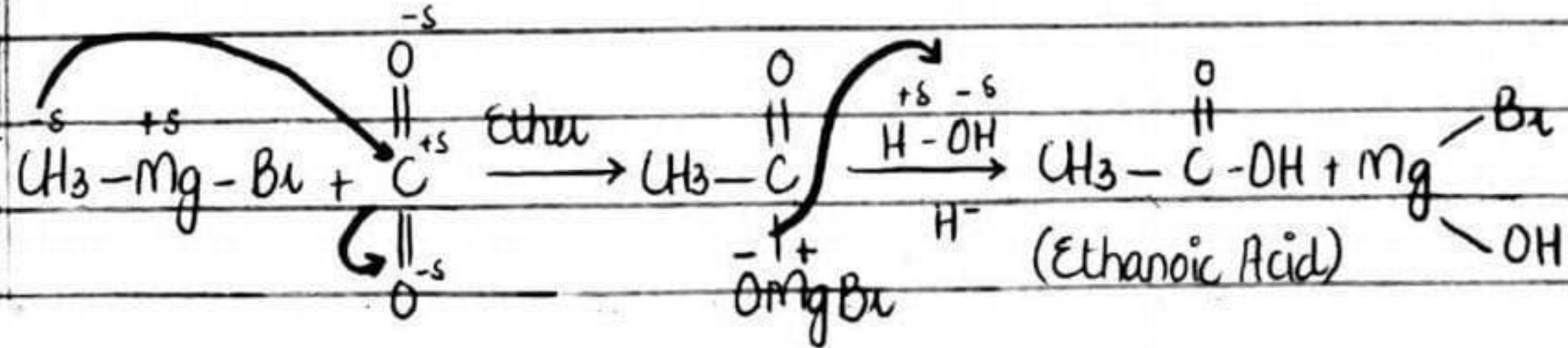
The addition of a proton ( $\text{H}^+$ ) to an atom, molecule or an ion, forming its conjugate acid is called protonation.

Example:



3- How " $\text{RMgX}$ " reacts with  $\text{CO}_2$ ?

## REACTION WITH $\text{CO}_2$ :



4- Write the formula of Grignard's Reagent.

The general formula of Grignard's Reagent is:  $R-Mg-X$

where, "R" is any alkyl group and "X" is halogen atom.

Examples:

\* Methyl magnesium Chloride:  $CH_3-Mg-Cl$

\* Ethyl magnesium Bromide:  $CH_3-CH_2-Mg-Br$

# Chapter 18

## Alcohols, Phenols and Ethers

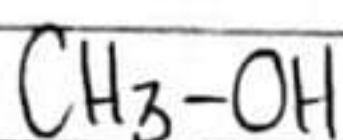
### Quick Quiz 1

i) What are monohydric and polyhydric alcohols?

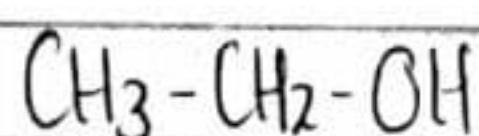
#### Monohydric Alcohols :-

Alcohols containing one -OH group are called monohydric alcohols.

#### Examples :-



Methanol

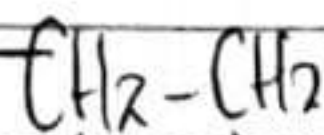


Ethanol

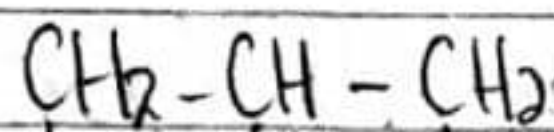
#### Polyhydric Alcohols :-

Alcohols containing two or more hydroxyl groups are called polyhydric alcohols.

#### Examples :-



1,2-Ethanediol

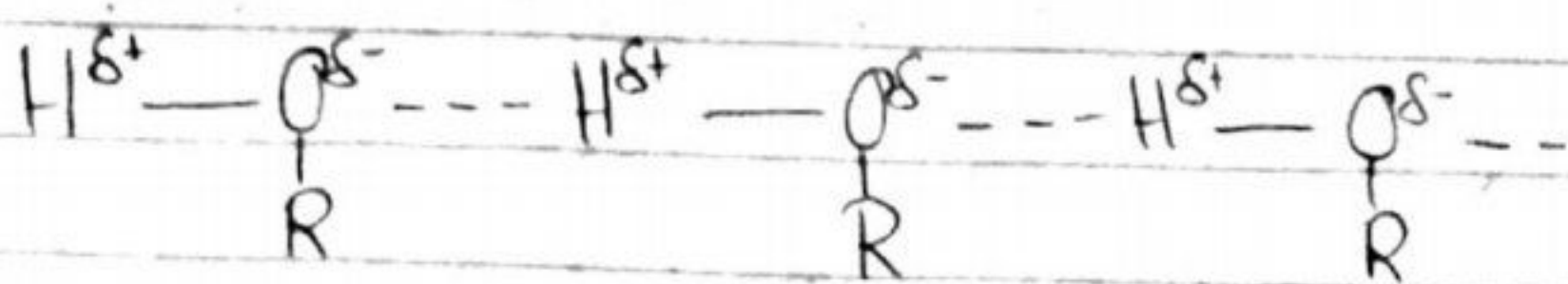


1,2,3-Propanediol

ii) Why are some alcohols readily soluble in water?

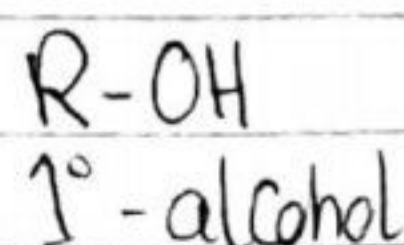
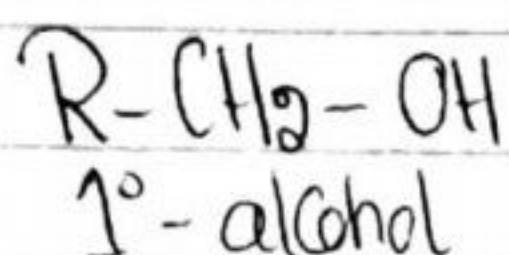
⇒ Small alcohol, e.g. methanol and ethanol, are readily soluble in water.

⇒ The solubility of alcohols is due to hydrogen bonding which is significant in lower alcohols but decreases in higher alcohols due to increase in non-polar nature of alkyl (R) group.

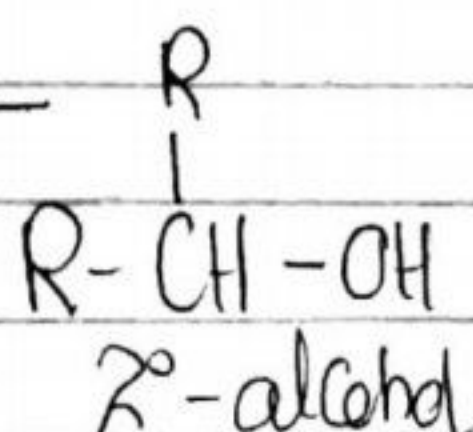


iii) Write general formulas of 1°, 2° and 3° alcohols.

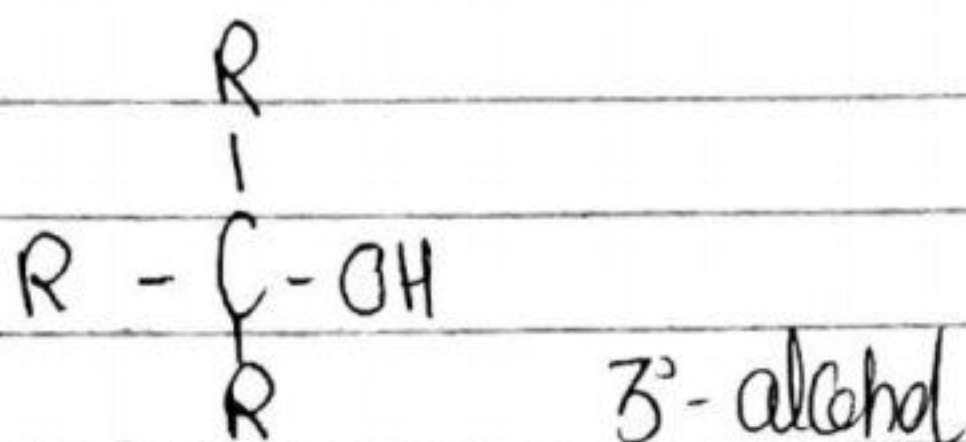
1°-Alcohols :-



2°-Alcohols :-

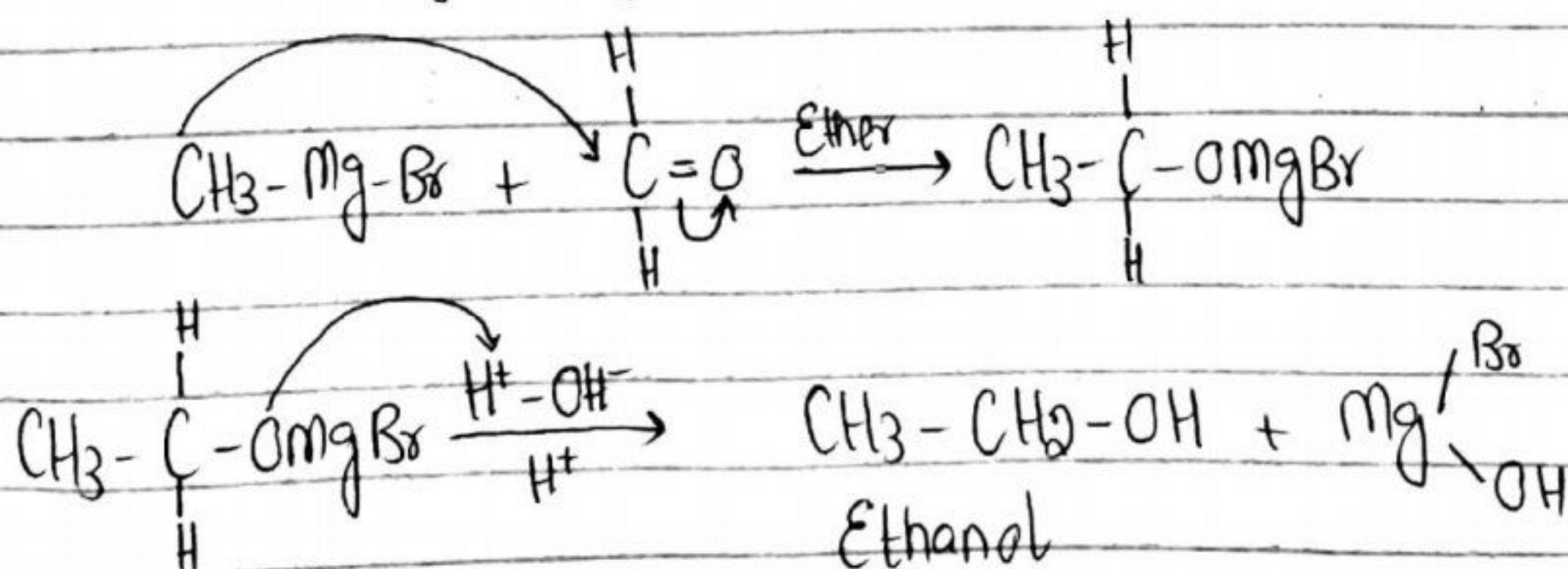


3°-Alcohols :-



iv) How Grignard's reagent is used for preparation of 1°-alcohols?

⇒ Formaldehyde give 1°-alcohol with Grignard's reagent



## QUACK QUIZ 2

i) What is acidic order of carboxylic acid, phenol and ether?

### Acidity Order

Carboxylic acid > phenol > Ether

ii) Why phenols are reactive towards electrophilic aromatic substitution?

- ⇒ Phenols are very reactive towards electrophilic aromatic substitution.
- ⇒ The OH group is an ortho-para director therefore it produces ortho-para products.
- ⇒ The OH group is an activator and it donates electrons to benzene ring (as ortho-para directing groups are electron donor). Thus it activates the ring.
- ⇒ Hence, mild conditions are needed for electrophilic aromatic substitution of phenol than that of benzene.

iii) Alcohols & phenols both contain -OH group. What is difference b/w them.

### Alcohols :-

- ⇒ The general formula of alcohol is R-OH.
- ⇒ Alcohols are hydroxyl derivatives of alkanes.

⇒ Lower alcohols are generally colourless liquids.

⇒ Alcohols have characteristic sweet smell and burning taste.

### Phenols :-

⇒ Phenols are derivatives of alcohols.

⇒ It's melting point is  $41^{\circ}\text{C}$

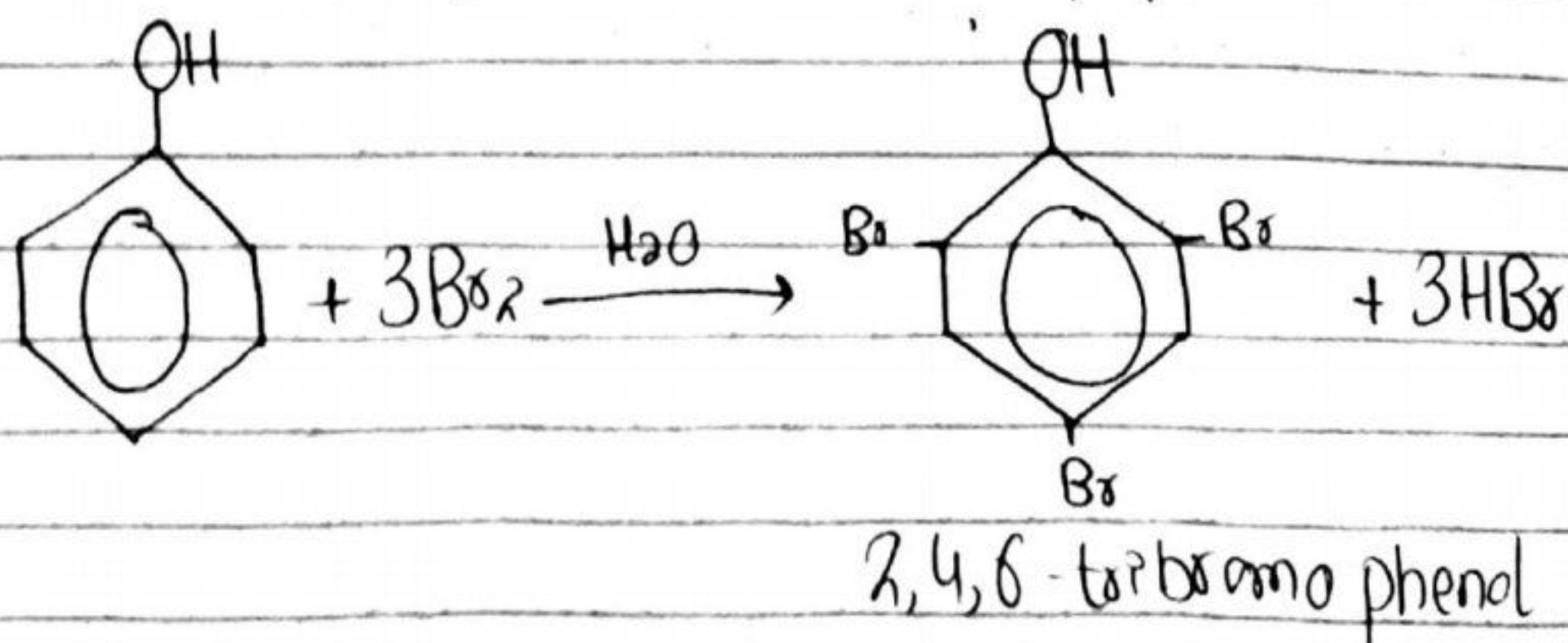
⇒ They have a characteristic phenolic odor.

⇒ They are colourless, crystalline, deliquescent solids.

iv) What happens when phenol is treated with bromine water?

⇒ Aqueous solution of phenol reacts with bromine water to give white precipitates of 2,4,6-tribromophenol.

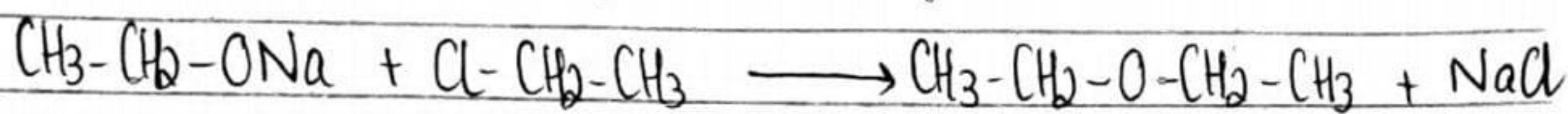
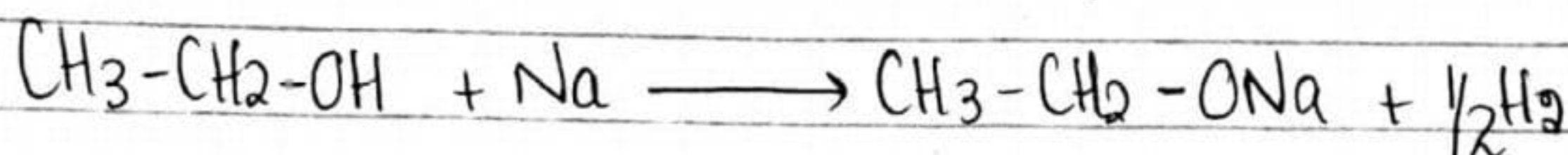
⇒ The red color of bromine water is discharged. This test is used for identification of phenol.



# Quick Quiz 3

i) How is diethyl ether prepared in Laboratory?

Conversion of alcohols to ethers:-

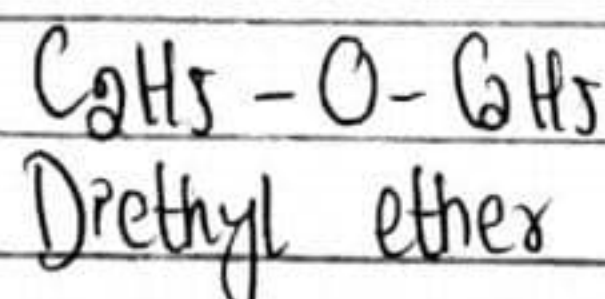
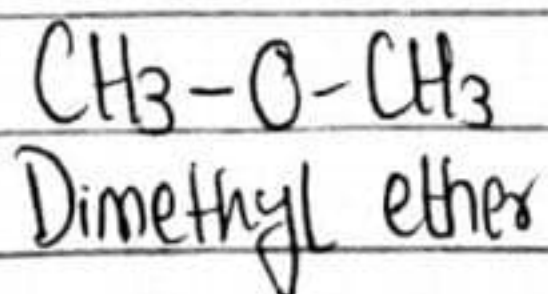


ii) What are symmetrical and unsymmetrical ethers?

Symmetrical Ethers:-

Ethers which contain same alkyl groups on both sides of oxygen atom are called symmetrical ethers.

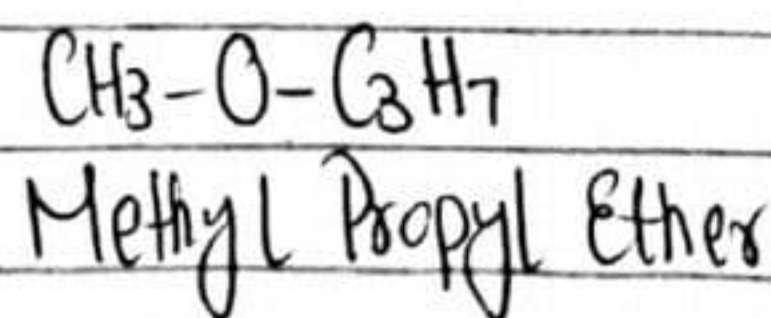
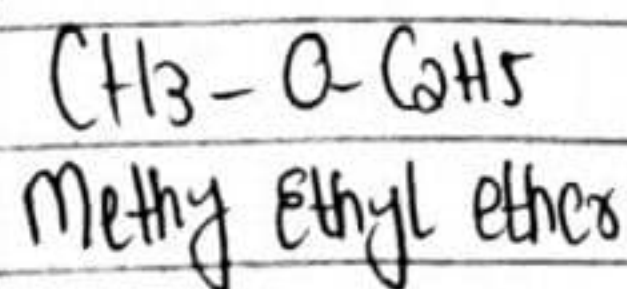
Examples:-



Unsymmetrical Ethers:-

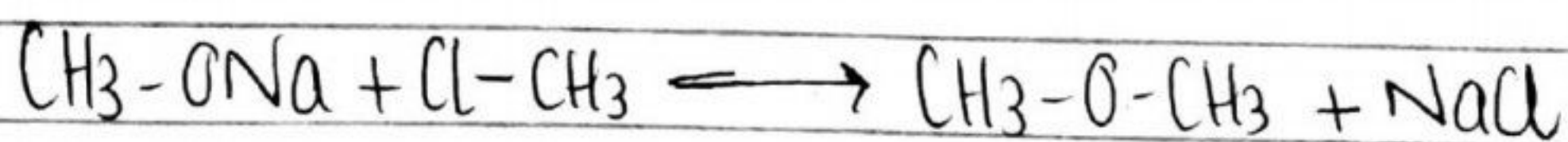
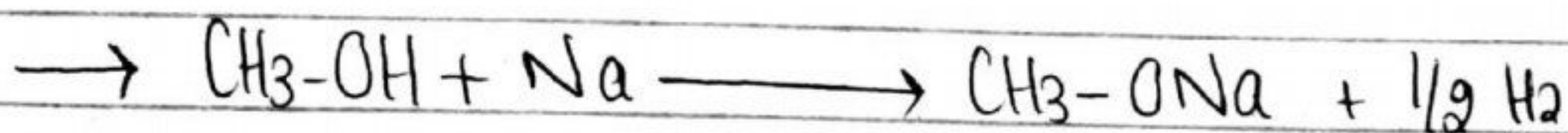
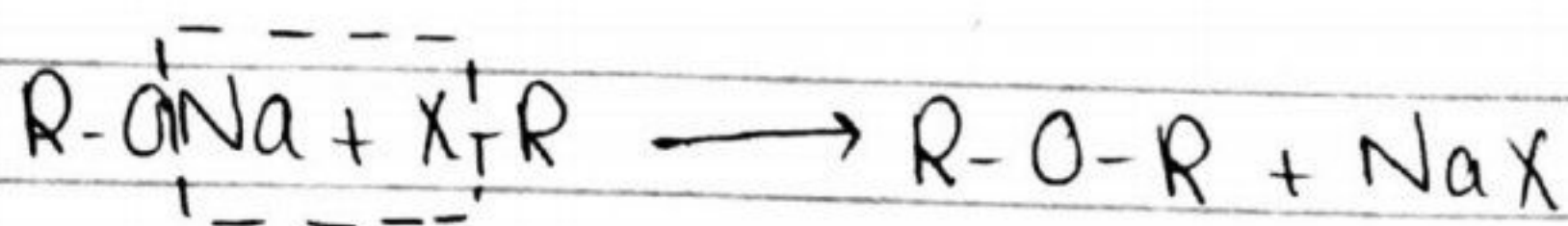
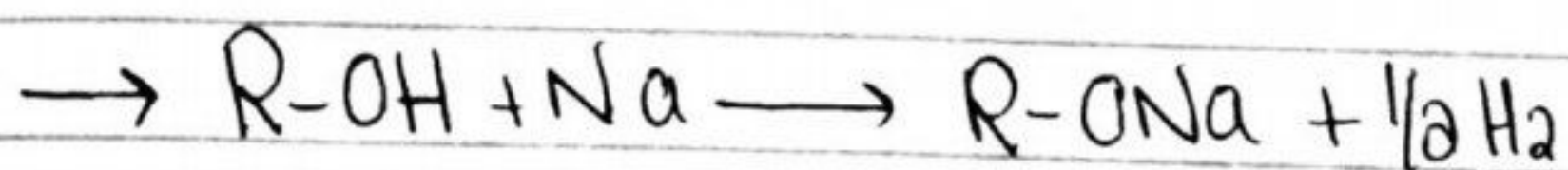
Ethers which contain different alkyl groups on both sides of oxygen atom are called unsymmetrical ethers.

Examples:-



iii) What is Williamson's synthesis?

→ This test gives both symmetrical and unsymmetrical ether



# QUICK QUIZES

"1"

1. What are carbohydrates? Give its general formula.

These organic compounds that contain Carbon, hydrogen & oxygen are called carbohydrates.

They have general formula  $C_n(H_2O)_n$ .

2. Quote one example of each type of carbohydrates.

(a) Monosaccharide:

Glucose, Galactose & Fructose.

(b) Disaccharide:

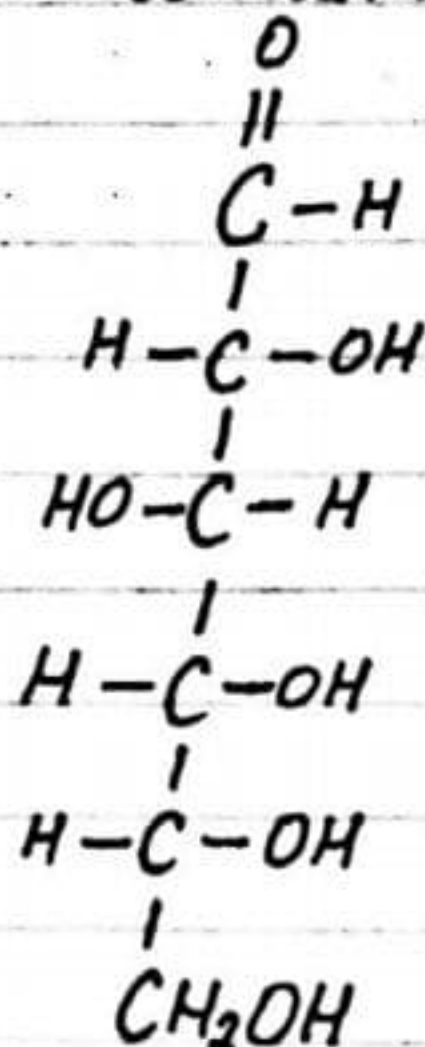
Lactose, Maltose & Sucrose.

(c) Polysaccharide:

Starch & cellulose.

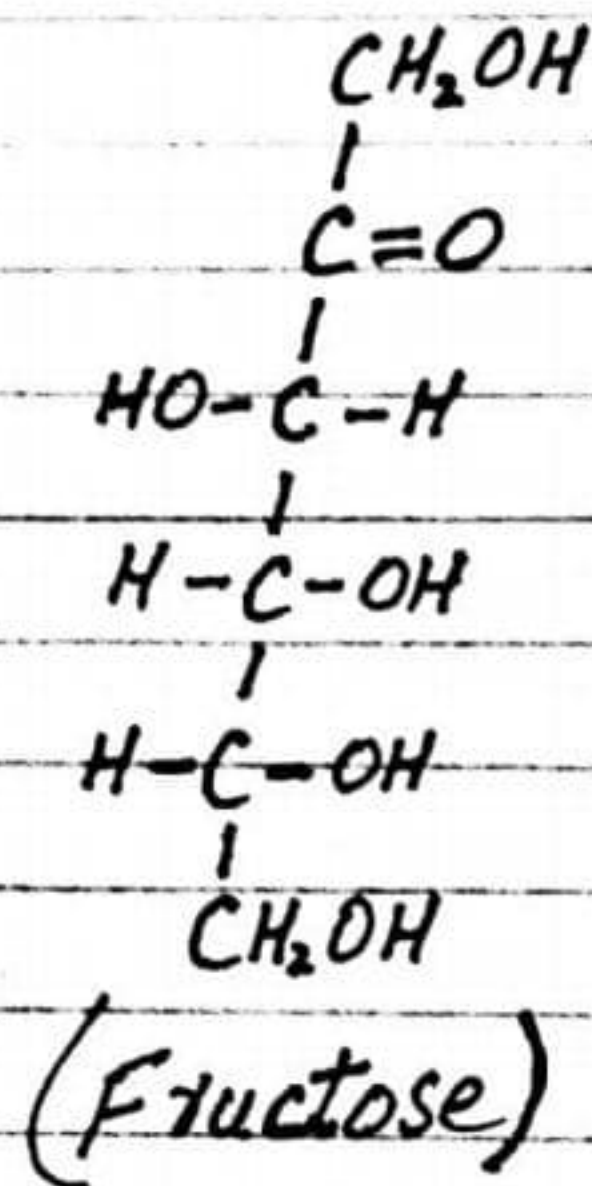
3. Write structural formulae of glucose & Fructose.

→ Glucose contains aldehydic group.



(Glucose)

→ Fructose contains ketonic group.



4. What do you understand by glycemic index?

The new system for classifying carbohydrates is glycemic index.

→ Glycemic index ranks food how they can affect blood sugar level by measuring that how much blood sugar level increase after eating.

5. How much calories do 1gm of carbohydrate have?

1 gram of carbohydrate have about 4Kcal.

6. On what factors tooth decay depend?

Tooth decay depends upon following factors:

- Degree of oral hygiene.
- Some genetic factors.
- type of food being eaten.
- Availability of fluoride.

**What are proteins? Give its simple classification?**

"Those molecules which yield amino acids on complete hydrolysis are called proteins."

→ Classification of proteins are:

- a) Simple proteins. (Albumin, Histone)
- b) Conjugated proteins. (Glycoprotein, phospho protein)
- c) Derived proteins. (proteins, peptides)

**2. Differentiate primary, secondary & Tertiary structures of proteins.**

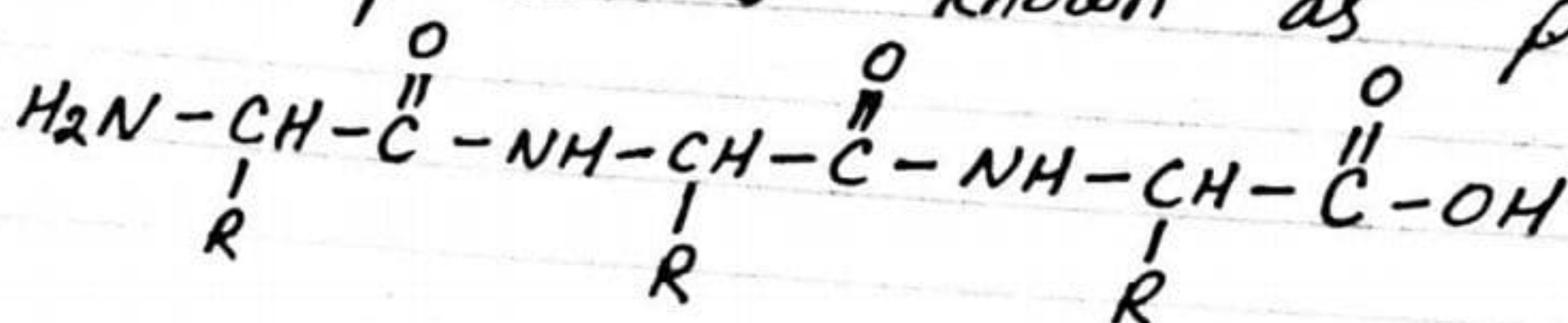
→ That structure which contains sequence of amino acid in a peptide chain is called **primary structure of protein.**

→ That structure in which polypeptide chain is present in spiral fashion is called **Secondary structure.**

→ That structure in which polypeptide chain is present in the form of folding or in twisting manner is called **Tertiary structure of protein.**

**3. What are polypeptides?**

"When amino acids are joined together in a long chain by peptide bond, then the compound is known as **poly peptide.**"



(Poly peptide)

What are lipids? Shortly explain the property that all the lipids have in common.

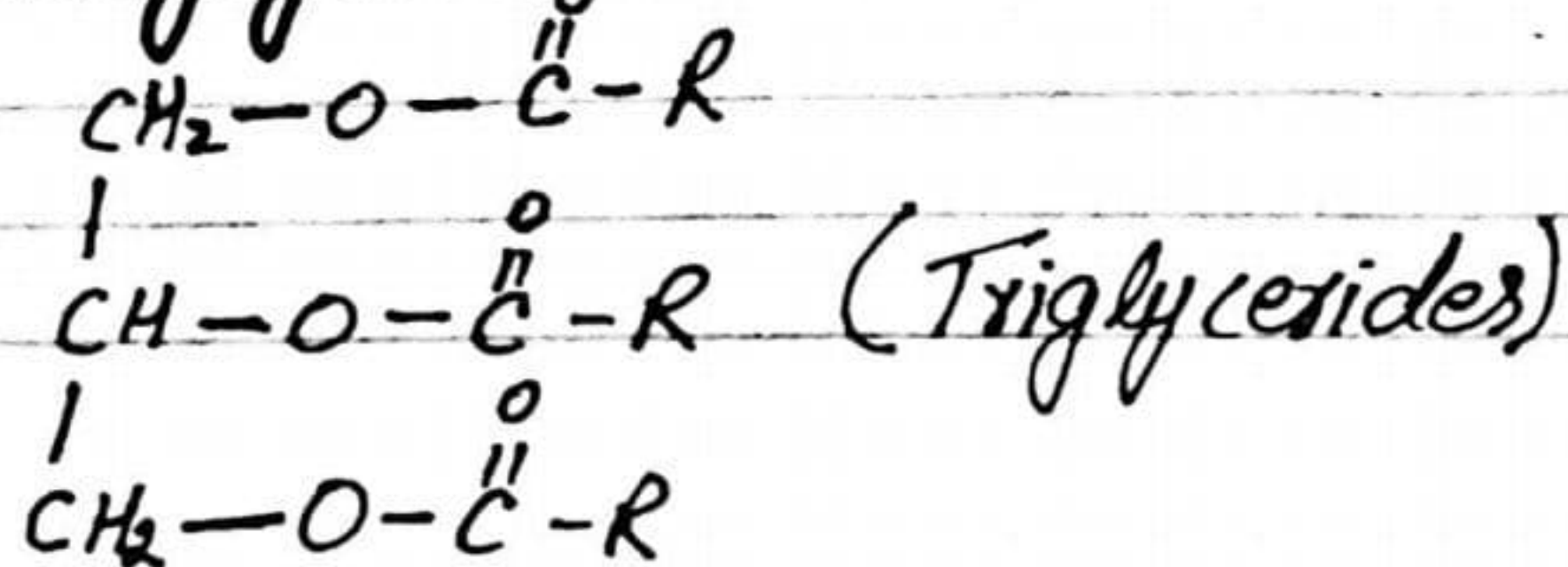
"Naturally occurring organic compound found in animals & plants and is insoluble in organic solvents is called lipid."

properties:-

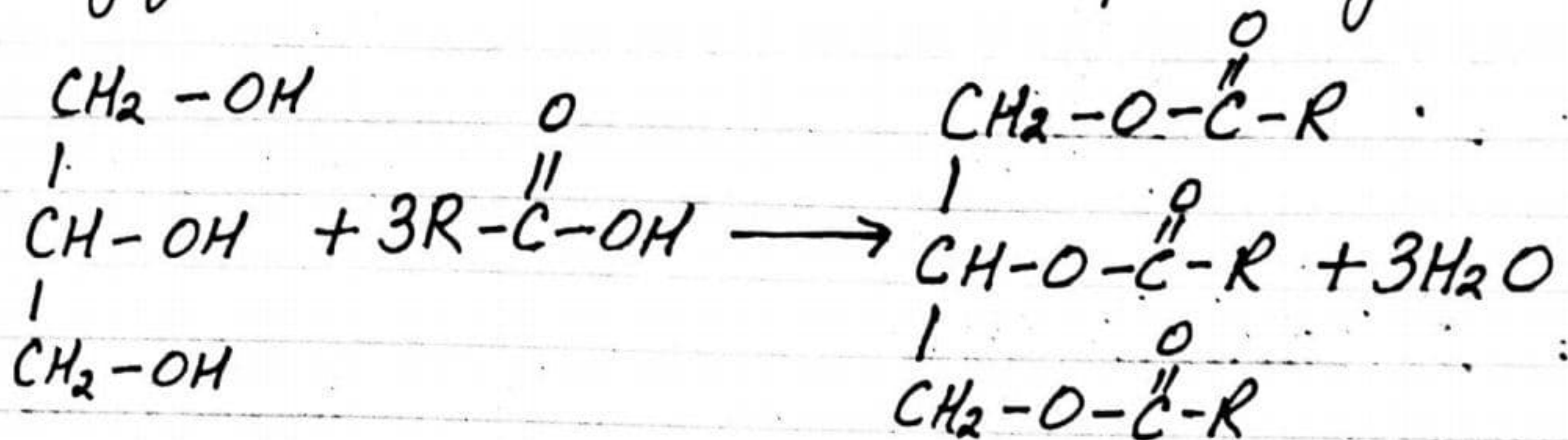
- Insoluble in water.
- Lighter than water.
- Poor conductor of heat & electricity.

2. What are Triglycerides? Draw its structure.

"One molecule of glycerol & 3-molecules of fatty acids are combine together to form Triglyceride."



3. Explain briefly the structure of lipids?
- Fats & oils are generally known as lipid.
  - Lipid contains one molecule of glycerol & three molecules of fatty acids.



"5"



1. Write the names of structural components of DNA & RNA?

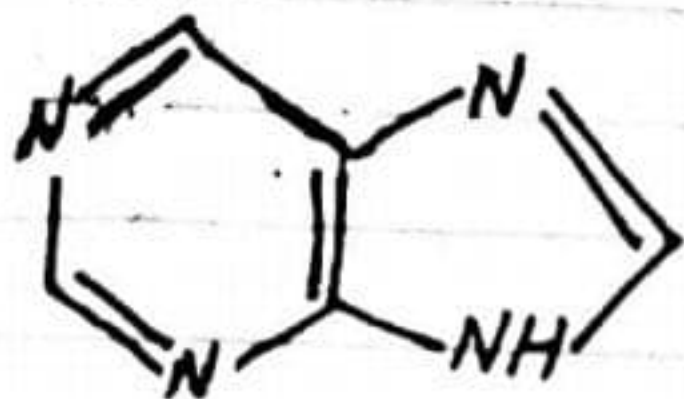
Structural components of DNA & RNA are:

- 5-Carbon sugar or pentose sugar.
- Nitrogenous bases.
- Phosphate group.

2. Differentiate purines & pyrimidines.

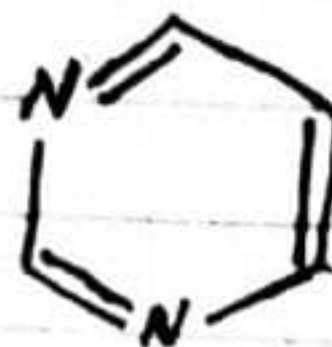
**Purines**

- It contains Adenine and Guanine.



**Pyrimidines**

- It contains Thymine, Cytosine & Uracil.



Which purines are present in both DNA & RNA.

Adenine & Guanine are present in both DNA & RNA.

"6"

What is biological significance of mineral?

Biological significance of minerals are:

- Minerals are necessary for body as like oxygen.
- They maintain all physiological processes.
- Helps in transmission of message.
- Found in organic & inorganic food.
- Vitamins cannot be properly assimilated without the correct balance of minerals.

2. Define mineral. Give its percentage present in human body.

"The term mineral refers to the chemical that present in the ash of calcined tissue."

- 5% of minerals are present in human body.

Muhammad Javed Iqbal  
HOD Chemistry  
Askaria Colleges Rwp.

3. Minerals of which metals are required for assimilation of vitamins B, C & E.

- Magnesium is required for the assimilation of vitamin B.
- Calcium is required for vitamin C.
- Selenium is essential for vitamin E.

4. What problems are caused by the deficiency of calcium & phosphorus?

## Calcium:-

Deficiency of calcium may result in softening of bones, rickets, poor growth, osteoporosis & mental depression.

## Phosphorus:-

Its deficiency may cause irregular breathing, anxiety, fatigue and skin sensitivity.

## 5. Give importance of Zinc mineral.

Importance of zinc are:

- Involves in human's metabolism.
- It is a need of enzyme for catalytic activity.
- Vital to immune resistance.
- Maintain normal vitamin 'A' level.

## 6. Give Importance/significance of

### (i) Keratin:-

- It is a fibrous protein play structural & supporting role in nails & hair.

### (ii) Myosin & Fibrin Fibrous proteins:-

#### Myosin:-

It plays important role in muscle cells.

#### Fibrin:-

Support in blood clotting.

## 7. How much intake of manganese should be per day.

Minute amount of manganese should be taken per day.

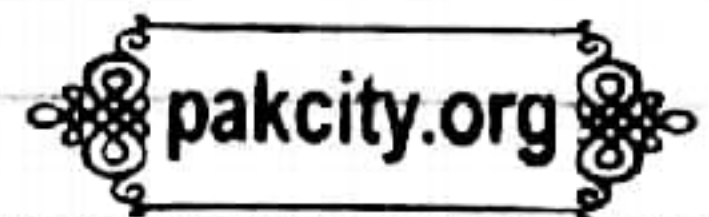
# 1. How hibernating animals obtain energy during hibernation.

These animals store large amount of fats in their body. During winter, metabolic activities decreased then these animals use stored fat for ATP production during oxidation process.

## 9. Give few macro & micro minerals.

Some macro minerals are:

- Calcium
- Chloride
- Sodium
- potassium &
- Sulphur etc.



Some micro minerals are:

- Iron
- Iodine
- Silicon
- Copper &
- Cobalt etc.

## 10. How much Sodium & potassium should be taken per day.

0.3 to 2.0 grams of Na & K should be taken per day.

## 11. What is Insulin?

- Insulin is the first antibiotic found in the world.
- It is produced by pancreatic beta cells.
- It contains 51 amino acids peptide. It is used to treat some forms of diabetes.

← THE END →