EXERCISE

- MCQ's
- SHORT QUESTIONS
- LONG QUESTIONS

MCQ's :-

i	b	viii	b	xv	a
ii	c	ix	b	xvi	d
iii	b	x	a	xvii	c
iv	a	xi	c	xviii	b
v	b	xii	c	xix	a
vi	d	xiii	b	xx	c
vii	d	xiv	c		

SHORT QUESTIONS

ANSWERS

Q(i) Although Na & P are present in same period yet their oxides are different in nature Na_2O is basic while P_2O_5 is acidic. Why?

Ans Sodium is a metal, metal forms basic oxide because when they are dissolved in water they form base

$$Na_2O + H_2O \longrightarrow 2NaOH$$

Phosphorous is non-metal, non-metal forms acidic oxide because when they are dissolved in water they form acid.

$$P_2O_5 + 3H_2O \longrightarrow 2H_3PO_4$$

Q(ii) How acidic, basic and amphoteric behaviour of oxides is explained?

Ans Metal forms basic oxide because when they are dissolved in water they form base

$$MgO + H_2O \longrightarrow Mg(OH)_2$$

Non-metal forms acidic oxide because when they are dissolved in water they form acid

$$SO_3 + H_2O \longrightarrow H_2SO_4$$

Amphoteric oxide is insoluble in water but they are soluble in acid as well as base

$$Al_2O_3 + HCl \longrightarrow 2AlCl_3 + 3H_2O$$
$$Al_2O_3 + 2NaOH + 3H_2O \longrightarrow 2NaAl(OH)_4$$

Q iii) Why the elements of group I are called Alkali metals?

Ans) Name Alkali came from arabic means ashes. Arabs use this term for IA group element because ashes of plant are mainly composed of sodium and potassium Alkali metal include Li, Na, K, Rb, Cs, Fr

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Q iv) Why all group I metals have low ionization energy?

Ans) Alkali metals have large size as compare to other group element in same period Distance between nucleus and outermost electron is large, force of attraction between nucleus and outermost electron is less, removal of electron is easy due to less effective charge. so alkali metals have low value of ionization energy and electronegativity.

Qv | Why do the group I metals show strong electropositive character ?

Ans. | Ease of removal of electron is called electropositivity. Alkali metals have strong electropositive character due to large size, less effective nuclear charge and ease of removal of electron.

Qvi | Why do group I metals show strong reducing properties ?

Ans | Substance which reduce others but itself oxidized is called reducing agent. Their size is large as compared to other group element. The effective charge is less, so removal of electron is easy. They reduced others and itself oxidized.

Qvii | Why different colours are imparted by the atoms of group I metals to flame?

Ans. | The outer electron of atom of alkali metals is loosely held with the nucleus and hence it can be easily excited to the higher energy levels even by a small amount of heat energy. During the excitation process the electron absorbs some energy and when this excited electron comes back

to its orignal position, it gives out absorbed energy in the form of light in visible region of the electromagnetic spectrum and hence the colour is imparted by the atoms to the flame. As the amount of energy absorbed during the excitation process is different in different atoms, different colours are imparted by atoms to the flame.

Colours:

ELEMENTS	FLAME COLOURS
Li	Red (crimson)
Na	Golden yellow
K	Violent

Qviii Why the elements of group II are called alkaline earth metals?

Ans IIA group elements are also called Alkaline earth metal, because there oxide are basic in nature and they are widely distributed in earth crust. They includes Be, Mg, Ca, Sr, Ba, Ra

Q ix | Why do the group II earth metals have high melting and boiling points than alkali metals?

Ans | Melting and Boiling point depends on number of binding electron, higher will be the number of binding electrons higher will be melting and boiling point and vice versa. IA group elements use 1e- for binding and IIA group elements use 2e- for binding. So IIA group elements have high melting and boiling point as compare to group I element.

Q x | What is milk of Magnesia? Give its one use.

Ans | Suspension of magnesium hydroxide in water is called Milk of Magnesia

USE:-
It is use for the treatment of acidity in stomach.

Q xi | How do group I metals differ from group II metals?

	IA Group metals	IIA Group metals
1-	They have 1 electron in their outermost shell	They have 2 electrons in their outermost shell.
2-	They have low melting and boiling point	They have high melting and boiling point.
3-	They donot react with Nitrogen to form nitride except lithium e.g	They react with Nitrogen to form nitride e.g $3Mg + N_2 \longrightarrow Mg_3N_2$
4-	Their carbonate are stable on heating except lithium carbonate e.g $Na_2CO_3 \xrightarrow{\Delta}$ No reaction	Their carbonate are unstable on heating and decompose into their oxide e.g $MCO_3 \xrightarrow{\Delta} MO + CO_2$
5-	Their nitrate are decomposed into nitrite on heating except lithium nitrate e.g $2NaNO_3 \longrightarrow 2NaNO_2 + O_2$	Their nitrate are decomposed into their oxide on heating e.g $Mg(NO_3)_2 \rightarrow MgO + 2NO_2 + \frac{1}{2}O_2$

Q xii | Discuss the metallic and non-metallic character of group IV elements.

Ans. | Metallic character increases down the group in IV A group elements.

C, Si — Ge — Sn, Pb

Non-metals — Metalloid — Metals

—— Metallic character increases →

The change from non-metallic to metallic character with the increase in atomic number is due to the reduction in effective nuclear charge and increases in the number of available orbitals with the increase in the size of atoms.

Q xiii | Discuss the general group trends of group VII elements!

1- Atomic size, melting and boiling point increases down the group.

2- Electron affinity, electronegativity and ionization energy decreases down the group.

3- oxidizing power of halogens decreases down the group.

Q xiv | Why the term halogen is used for group VII elements ?

Ans | VII A group elements are also called halogens and halogens means salt forming because they react with alkali and alkaline earth metals form salts.

Q xv | Why does fluorine differ from other members of its group ?

Ans | Fluorine (F_2) is differ from their members of its group due to following reasons :

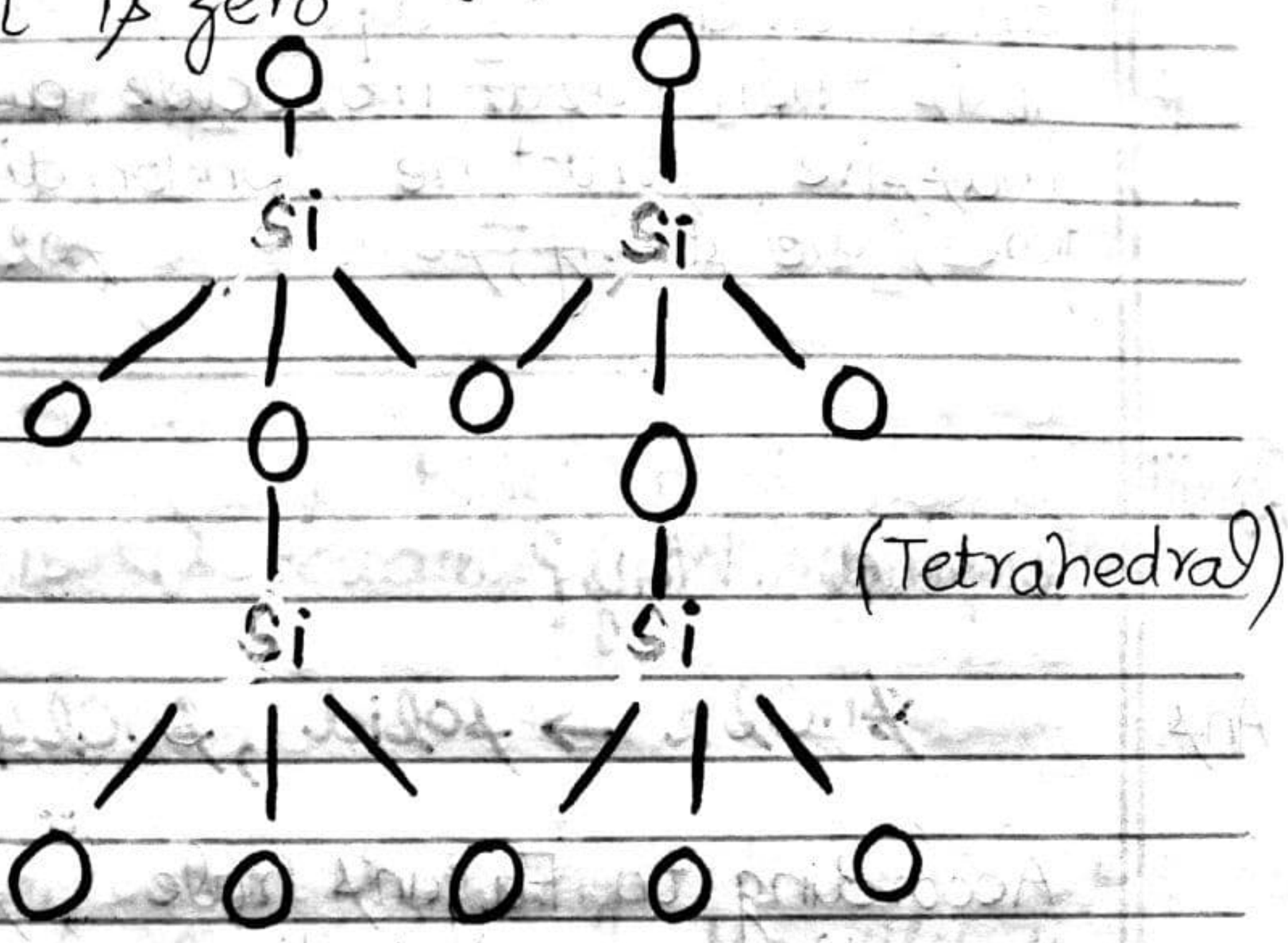
1- Small atomic size
2- High electronegativity
3- low dissociation energy
4- lack of d-orbital
5- during bonding it follows octet rule.

Q xvi | What is the structure of CO_2 and SiO_2 and how they differ ?

Ans | CO_2 has linear structure , It's dipole moment is zero.

$$O = C = O$$

SiO_2 is macro-molecule, It has tetrahedral arrangement, Its dipole moment is zero



(Tetrahedral)

★ Differences:

1 Carbon has small size as compare to silicon

2- Carbon is bonded with 2 oxygen and silicon is bonded with 4 oxygen

3- Carbon forms double bond with O_2 and silicon forms single bond with O_2

Qxvii CO_2 is gas while SiO_2 is a solid although C and Si belong to same group?

Ans CO_2 has linear structure, Its dipole moment is zero, It is non-polar molecule due to small size. London dispersion forces are

weak so CO_2 is a gas. SiO_2 is a macro-molecule, It has tetrahedral arrangement, Its dipole moment is zero It is non-polar molecule due to massive structure, london dispersion forces are strong, so it is a solid.

Qxviii $SnCl_2$ is a solid and $SnCl_4$ is a liquid. Why?

Ans. $SnCl_2$ → solid, $SnCl_4$ = liquid

" According to Fajan's rule, smaller the cation greater is the amount of covalent character in compound ".

In $SnCl_4$, Sn has +ve 4 charge and in $SnCl_2$, Sn has +ve 2 charge Sn^{+4} is smaller cation as compared to Sn^{+2}. so $SnCl_4$ is covalent compound and $SnCl_2$ is ionic compound. As ionic bond is stronger than covalent bond, therefore $SnCl_2$ is solid and nCl_4 is liquid.

Qxix C and Si are always tetravalent but Ge, Sn and Pb show divalency Why?

Ans. C and Si are non-metals, non-metals

forms covalent compound. They are stable in higher oxidation state, so C and Si are tetravalent, Ge, Sn, Pb have metallic nature. They form ionic-compound, they are stable in lower oxidation state so they are divalent (Pb, Sn & Ge)

Qxx CCl4 is resistant to hydrolysis but SiCl4 is readily hydrolysed. Why?

OR

Qxxi Si-Cl bond is stronger than C-Cl bond still SiCl4 hydrolysed easily but CCl4 is not. Why?

Ans. C atom being a member of 2nd period of the periodic table, has no d-orbitals in its valence shell and hence is unable to accomodate the lone pair donated by the donor oxygen atom of H_2O molecule to form an unstable intermediate compounds. Thus the tetrahalides of C are not hydrolysed. On the other hand Si, Ge and Sn have vacant d-orbitals which can accept the lone pair and thus the tetrahalides get readily hydrolysed.

Qxxii | Explain why nitrates and carbonates of Li are not stable?

Ans | $2LiNO_3 \xrightarrow{\Delta} Li_2O + 2NO_2 + \frac{1}{2}O_2$

$Li_2CO_3 \xrightarrow{\Delta} Li_2O + CO_2$

Li has small size as compared to other alkali metals. Lattice energy is inversely proportional to size. lattice energy of resulting oxide is greater due to small size. Resulting oxide become stable therefore nitrate are carbonates of Li are easily converted into product.

Qxxiii | Differentiate the behaviour of Li & Na with atmospheric oxygen.

Ans | Li react with atmospheric oxygen forms normal oxide

$4Li + O_2 \longrightarrow 2Li_2O$

Na react with atmospheric oxygen forms per oxide

$2Na + O_2 \longrightarrow Na_2O_2$.

Qxxvi | Oxidizing power of F_2 is greater than I_2. Why?

Ans | Oxidizing power depends on dissociation energy as well as electron affinity.

oxidizing powers of halogens depends on following factors :-

1- Dissociation energy
2- Electron affinity
3- Hydration energy

Reason:

F_2 has low dissociation energy, high electron affinity and high hydration energy as compared to I_2. so F_2 has strong oxidizing power as compare to I_2.

Qxxvii | HF is weak acid than HI. Why?

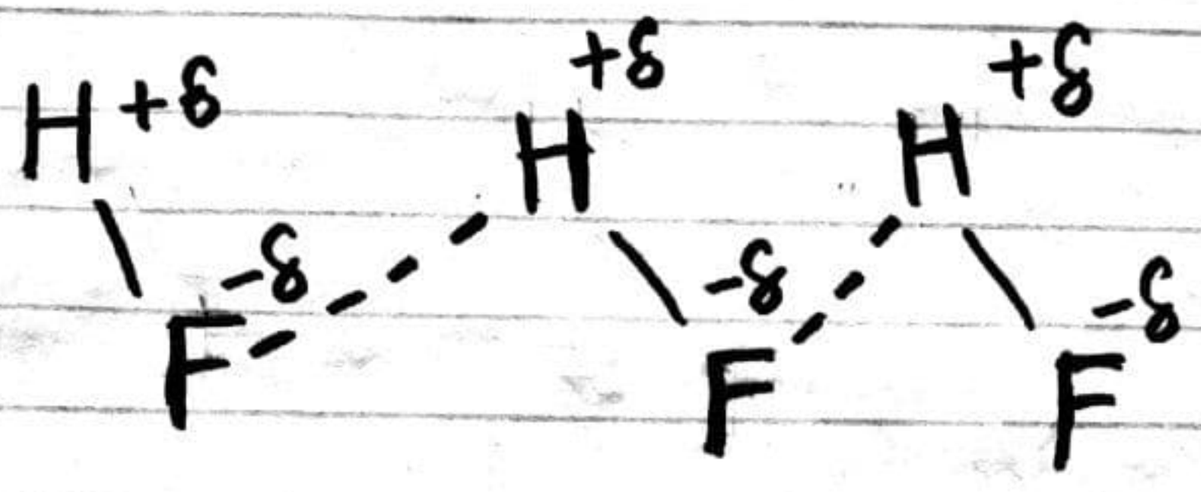
Ans | HF is weak acid as compare to HI due to following reasons :-

1- HF has high bond energy as compared to HI, It cannot donate proton easily in H_2O.

2- In HF, there is hydrogen bonding in zig zag manner. Hydrogen bonding is

interact between 2 F_2 atoms.

3- It cannot donate proton easily.



Qxxviii On what factors does the oxidising power of halogens depends ?

Ans Oxidising power of halogens depends on following factors :-

1- Dissociation energy
2- Electron affinity
3- Hydration energy
4- Heat of vapourization (for Br_2 and I_2 only)

→ **NOTE :**
Halogens have low dissociation energy, high electron affinity, high hydration energy, it will have high oxidising power

Long questions

Q.3:-

(i)

Part(a)- The pattern of first ionization energy and melting and boiling point is not smooth. Justify it.

Consult with theory notes.

Part(b) Why atomic radius increase in the group and decrease in the period.

Consult with theory notes.

Part(c) Describe the trends in reactions of period 3 element with water?

consult with theory notes.

Part(d) Melting and boiling points of The elements is increase from left to right up to middle in period 3 element and decrease onward. Why?

consult with theory notes.

(ii)

Explain matalic oxides and Silicon di-oxides under followings heading.....

(i) Structure

(ii) Melting and boiling Points.

(iii) Electrical conductivity.

Consult with Theory notes.

(iii)

Explain acid - base behaviour of

(i) Aluminium oxides.

(ii) Sodium oxides.

Consult with Theory notes.

(iv)

(a) Why are different types of oxides form as you go down the group?

Consult with Theory notes.

(b) How berrylium differ other members of its group?

consult with Theory notes.

(c) Why beryllium cholride covelent not imic?

consult with Theory notes.

(v)

(a) Why does some metals form peroxide on heating in oxygen?

Consult with Theory notes.

(b) Why does group II elements form nitrides on heating in air?

Consult with Theory notes.

(c) Disscuss Trend in solubility of hydroxide of group II elements?

Consult with Theory notes.

(vi)

Discuss Trends in Thermal stability of carbonates and nitrates of group II elements?

consult with Theory notes.

(vii)

Explain with examples That Beryllium hydroxide is Amphotaric?

Consult with Theory notes.

(viii)

Explain inert pair effect in the....

(i) formation of imic bond.

(ii) formation of covelent bond.

Consult with Theory notes.

(ix)

Explain acid - base trend in group 4 oxides?

Consult with Theory notes.

(x)

Explain The trends in group 7 of following physical properties

(i) Electronegativity.

consult with Theory notes.

(ii) Electron Affinity.

Consult with Theory notes.

(xi)

(a) Why is bond enthalpy of F-F less as comparred To Cl-Cl and Br-Br?

Consult with Theory notes.

(b) Why is F is much stronger oxidizing agen Than Cl?

consult with Theory notes.

(Xii)

(a) Explain order $F > Cl > Br > I$ with respect to oxidizing power.

Consult with Theory notes.

(b) HCl is strong acid as compared to HF. Why?

Consult with Theory notes

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