PART-I (SHORT QUESTIONS)

Q.2 Write short answers to any SIX (6) questions.

(i) What is a Dobereiner's Triad? Give one example.

Ans. Dobereiner's Triad:

Definition:

"A group of three elements with similar chemical properties is called a triad".

Example of a Triad:

One triad group example is that of lithium (Li = 7), sodium (Na=23) and that of a potassium (K = 39). The atomic mass of sodium (Na =23) is the average of the atomic masses of lithium (Li=7) and potassium (K=39). This can be proved as follows:

Triad Elements	Group	Atomic Number of Elements	Average Atomic Mass
Lithium Sodium Potassium	(Li) (Na) (K)	7 23 39	$= \frac{7+39}{2}$ $= \frac{46}{2} = 23$

(ii) State and explain Newlands law of octaves. Give two examples.

Ans. Newland's Octaves:

In 1864 British chemist Newlands put forward his observations in the form of "law of octaves."

Law of Octaves:

Newlands noted that:

"There is a repetition in chemical properties of every eighth element if they are arranged by their increasing atomic masses."

Example 1:

Elements	Li	Be	B	C	N	O	F
Atomic Number	7	9	11	12	14	16	19

The properties of sodium (Na) are similar to those of lithium (Li).

Example 2:

Elements	Na	Mg	Al	Si	P	S	Cl
Atomic Number (Z)	23	24	27	28	31	32	35.5

The chemical properties of chlorine (Cl) are similar to those of fluorine (F).

(iii) Why the work of Newlands (law of octaves) could not get much recognition?

Ans. The work of Newlands could not get much recognition due to following two reasons:

(1) No space was considered for undiscovered elements.

(2) The noble gases were also not known at that time.

(iv) What was Mendeleev's period Table? What is meant by a period and a group?

Ans. In 1869, Russian chemist, Mendeleev arranged the known 63 elements in order of their increasing atomic masses, in horizontal rows called periods. So that elements with similar properties were in the same **vertical columns called groups**. This arrangement of elements was called Mendeleev's Periodic Table.

(v) Write down few demerits of Mendeleev's periodic table.

Ans. Demerits of Mendeleev's Periodic Table:

In spite of its numerous advantages, Mendeleev's periodic table has a few demerits in it. These are:

(1) He failed to explain the position of isotopes.

(2) He also suggested the wrong order of the atomic masses of some elements. Because atomic mass (A) of an element cannot serve as the basis for the arrangement of elements.

(vi) State Mendeleev's periodic law.

Ans. Mendeleev's periodic law:

"The properties of the elements are periodic functions of their atomic masses (A)."

(vii) What amendment was made by the H-Moseley in Mendeleev's Periodic Law?

Ans. Moseley modified Mendeleev's periodic law. He suggested that the properties of the elements are periodic function of their atomic numbers rather than atomic mass.

(viii) Why the improvement in the Mendeleev's periodic table was made?

Ans. Mendeleev's Periodic Table has following demerits:

(1) He failed to explain position of isotopes.

(2) He also suggested the wrong order of the atomic masses of some elements.

Due to these two above demerits, Mendeleev's periodic table was needed to be improved.

(ix) State modern periodic law.

Ans. Periodic Law:

"Properties of the elements are periodic function of their atomic numbers (Z)".

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Q.3 Write short answers to any FIVE (5) questions.

(i) Differentiate between groups and periods. What is the number in modern periodic table?

Ans. Groups:

"The vertical columns in a periodic table are called groups."

No. of Groups:

There are eighteen groups in a modern periodic table. They are numbered from left to right as 1 to 18.

Periods:

"The horizontal rows of elements in a periodic table are called periods."

No. of Periods:

There are seven periods in a modern periodic table. They are numbered from top to bottom as 1 to 7.

(ii) Write down the names of elements of group 1 with their symbols.

Ans. Names of elements of group 1 with their symbols are as following:

Name	Symbol	Name	Symbol
Hydrogen	H	Rubidium	Rb
Lithium	Li	Cesium	Cs
Sodium	Na	Francium	Fr
Potassium	K		

(iii) What do you mean by blocks of elements? How many blocks are present in a modern periodic table?

Blocks of Elements:

"On the basis of completion of a particular subshell, elements with similar subshell electronic configuration are referred as a block of element."

No. of Block: Modern periodic table is divided into four block which are s, p, d and f.

(iv) What is the name of 2nd period? Write the names of elements of 2nd Period.

Ans. 2nd Period:

Second period is called normal period. It contains 8 elements which are as following:

	Elements of 2nd Period	Symbols
(1)	Lithium	Li
(2)	Berylium	Be
(2)	Boron	B
(4)	Carbon	C
(5)	Nitrogen	N
(6)	Oxygen	O
(7)	Fluorine	F
(8)	Neon	Ne

(v) What is meant by a periodic function?

Ans. *"Periodic function is the common property of elements due to which other properties of elements change in regular intervals."*

For example, when elements are arranged according to their increasing atomic number (Z), their properties change after regular intervals. Thus, atomic number (Z) is a periodic function of elements.

(vi) What are noble gases? Write their names.

Ans. Noble Gases

"The gaseous elements of Group-18 or Zero group are called noble gases".

Names of Noble Gases:

(1)	Helium	(He)
(2)	Neon	(Ne)
(3)	Argon	(Ar)
(4)	Krypton	(Kr)
(5)	Xenon	(Xe)
(6)	Radon	(Ra)

(vii) How many elements are in 3rd period? Write their names and symbols.

Ans. There are eight (8) elements present in 3rd period. The names of these elements and symbols are as following:

Name	Symbol	Name	Symbol
iumSod	Na	Phosphorous	P
Magnesium	Mg	Sulphur	S
Aluminium	Al	Chlorine	Cl
Silicon	Si	Argon	Ar

(viii) What is meant by periodicity of properties? Name the properties of elements which show periodicity in their behaviour.

Ans. Periodicity of Properties:

"The repetition of similar properties after number of regular intervals in the periodic table is called periodicity of properties".

Properties of Elements Showing Periodicity in their Behaviour:

The physical and chemical properties of elements change periodically with the atomic number (Z). However, some atomic properties of elements like, atomic radius (atomic size), ionization energy, electron affinity, electronegativity and valency also show periodicity in their behaviour. These atomic properties depend upon the location of the elements in the periodic table. These properties show periodic variations in their behaviour.

Q.4 Write short answers to any FIVE (5) questions.

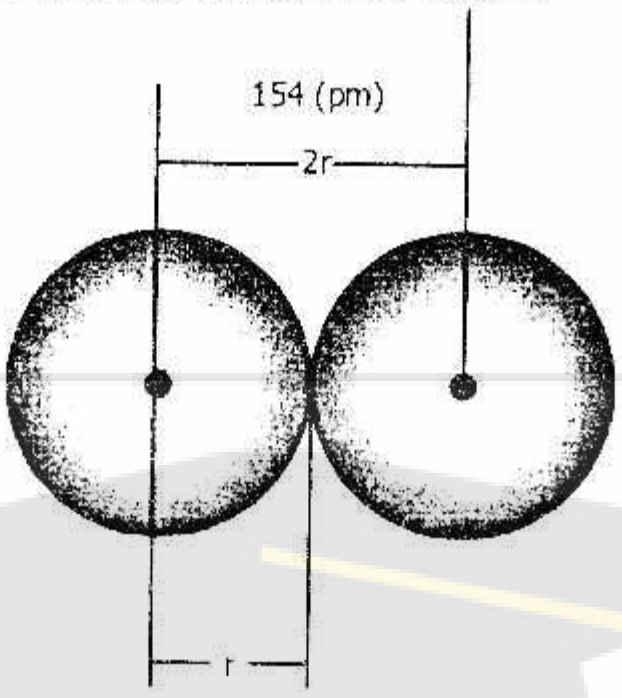
(i) Define atomic radius? How it is determine? What is its SI unit?

Ans. Atomic Radius:

"The half of the diameter of an atom is called its atomic radius".

Determination of Atomic Radius:

It is determined by the measuring the distance between the nuclei of two atoms and then dividing it by 2. For example, the distance between the nuclei of two carbon atoms in its elemental form is 154 pm. It means its half i.e. 77pm is radius of carbon atom.



SI Unit of Atomic Radius:

The SI unit of atomic radius is picometer (pm).

(ii) What is the trend of change in atomic radius in a period and a group?

Ans. Change in Atomic Radius in a Period:

When we move from left to right in a period although atomic number increases, yet the size of atoms decreases gradually.

Trends of Change in Atomic Radius in a Group:

The size of atoms or their radii increases from top to bottom in a group.

(iii) What is shielding effect? What is its trend in a group?

Ans. Shielding Effect: *"The effect of decrease in attractive force exerted by the nucleus on the valence shell electrons due to the presence of electrons lying between the nucleus and the valence shell is called shielding effect."*

Trend in a Group:

The shielding effect increases down to the group in the periodic table.

Reason:

As we move from top to bottom in a group the size of atoms increases i.e. number of shells in an atom increase. By the increase in number of shells, so, an electron revolving in the outer most shell will experience less electrostatic force of nucleus due to inner shell electrons.

Trend in a Period:

In a period, shielding effect decreases from left to right.

(iv) How does shielding effect decrease the forces of electrostatic attractions between the nucleus and valence electrons?

Ans. The electrons present between the nucleus and the valence shell (outermost shell) of an atom, reduce the nuclear charge felt by the electrons present in the valence shell. The attraction of outer electrons towards nucleus is partially reduced because of presence of inner electrons. As a result an atom experiences less nuclear charge than that of actual charge, which is called effective nuclear charge (Z_{eff}). It means that the electrons present in the filled energy level screen or shield the

force of attraction of nucleus felt by the valance electrons.

In this way shielding effect decreases the force of electrostatic attraction between the nucleus and outer most electrons.

(v) Define ionization energy. Describe the trend of change in ionization energy in a period and a group?

Ans. Ionization Energy: *"The ionization energy is the amount of energy required to remove the most loosely bound electrons from the valence shell of an isolated gaseous atom."*

Variation of Ionization Energy in a Period: *"The value of ionization energy of elements increases as we move from left to right in a period."*

Variation of Ionization Energy in a Group:

"The value of ionization energy of elements decreases from top to bottom in a group."

(vi) What is meant by electron affinity? Discuss its trends in a period and a group.

Ans. Electron Affinity:

"The amount of energy released when an electron is added up in the outermost shell of an isolated gaseous atom is called electron affinity".

Example:

$F + e^- \longrightarrow F^-$ $\quad \Delta H = -328\ kJmol^{-1}$

Trend of Election Affinity in a Periodic Table

"In a period, the value of electron affinity increases from left to right in the period."

Trend of Electron Affinity in a Group:

"In a group, the value of electron affinity decrease from top to bottom."

(vii) Define electronegativity? Describe its trend in a period and in a group.

Ans. Electronegativity:

"The ability of an atom to attract the shared pair of electrons towards itself in a molecule, is called electronegativity."

Trends of Electronegativity in a Period:

"The values of electronegativity of elements increases in a period from left to right."

Trends of Electronegativity in a Group:

"Electronegativity generally decreases down a group."

(viii) Why does the trend of electron affinity and electronegativity is the same in a period?

Ans. The trend of electronegativity is same as that of electron affinity in a period. It increases in a period from left to right.

Reason:

It is because the higher Z_{eff} (effective nuclear charge) shortens the distance of shared pair of electrons from the nucleus. Thus, enhances the power of the nucleus to attract the shared pair of electrons.

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PART-II (LONG/DESCRIPTIVE QUESTIONS)

Q.5 (a) Write down some salient features of long form of periodic table.

(b) What do you mean by blocks of elements? How many blocks are present in a modern periodic table? Explain in detail.

Ans. (a) **See Chapter 3** **Q.No.21**

(b) **See Chapter 3** **Q.No.22**

Q.6 (a) Discuss in detail the periods in Modern Periodic Table.

(b) What is a group? How many groups are there in a modern periodic table? Give the details of each group.

Ans. (a) **See Chapter 3** **Q.No.26**

(b) **See Chapter 3** **Q.No.31**

Q.7 **(a)** Define and explain shielding effect. Describe its trends in the periodic table?

(b) Define ionization energy. Describe the trend of change in ionization energy in a period and a group?

Ans. **(a)** **See Chapter 3** **Q.No.38**

(b) **See Chapter 3** **Q.No.41**

Q.8 **(a)** Define electron affinity. What is its unit? Define its trend in periodic table.

(b) Show why in a "period" the size from left to right.

Ans. **(a)** **See Chapter 3** **Q.No.13**

(b) **See Chapter 3** **Exc. Q.No.2**

Q.9 **(a)** What is a period? Describe the different periods of a modern periodic table.

(b) How the Long Form of periodic table is presented? Explain?

Ans. **(a)** **See Chapter 3** **Q.No.8**

(b) **See Chapter 3** **Q.No.4**

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PART-III (PRACTICAL QUESTIONS)

10. **(i) What is the effect of presence of impurities on the melting point of a solid?**

(ii) Give the examples of sublimation in daily life?

Ans. **(i)** Any impurity present in a given substance will lower its melting point even if the impurity melts at a higher temperature.

(ii) On industrial scale, freezed food is dried up using sublimation process. Brewed coffee is frozen and placed in a vaccum to remove water vapours. The ice continues to sublime until it is all gone, leaving freeze dried coffee.

11. **(i) Suggest two methods to separate a mixture of naphthalene and potassium chloride.**

(ii) Why lime water is turned milky?

Ans. **(i)** The components of a mixture of naphthalene and potassium chloride can be separated by the following two methods:

(a) Sublimation **(b)** Crystallization

(ii) When carbon dioxide gas is passed through lime water, it turns milky due to the formation of calcium carbonate which is soluble in water and gives milky colour to lime water.

$$CO_{2\,(g)} + Ca(OH)_{2\,(aq)} \longrightarrow \underset{\text{(soluble)}}{CaCO_{3\,(aq)}} + CO_{2\,(g)}$$

12.

(i) Why oil is immiscible with water?

(ii) Helium-oxygen mixture is used by deep sea divers in preference to nitrogen-oxygen mixture. Why?

Ans. **(i)** The general principle of solubility is that "like dissolves like". Since, water is polar solvent while sunflower is non-polar solvent. That is why water and oil are immiscible with each other.

(ii) As one comes up from the depths, pressure is reduced, and the excess gas comes out of solution and can block blood vessels (especially in the brain). That is why deep sea divers use helium-oxygen mixture instead of oxygen-nitrogen mixture.

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