UNIT 08

Periodic Table & Periodicity

Descriptive Questions

Q.1 (Ex. Q.4 (i)) Which information is needed to locate the elements in the periodic table if you do not know its atomic number? Is atomic mass helpful for this purpose? 09208001

Ans. To locate elements in the periodic table without knowing the atomic number, you need to know the element's properties like its atomic mass and chemical behavior.

Atomic mass

When elements are arranged in increasing order of their atomic mass, they show periodic repetition of properties **e.g**: Li, Na and K have increasing atomic mass and all in Group - 1.

Chemical behavior: Co-relates with groups and periodic trends confirm an elements position.

Example: Transition metals in d-block show variable states.

The atomic mass can help in some cases, but it may not be as precise as the atomic number for identifying elements. The atomic number is the most reliable way to locate elements in the periodic table as elements are arranged in increasing atomic number order.

Q.2 (Ex. Q.4 (ii)) How many blocks of elements are present in the periodic table? Are these blocks helpful in studying the properties of elements? 09208002

Ans. There are four blocks of elements in the periodic table: s-block, p-block, d-block and f-block. These blocks categorize elements based on their electronic configurations.

i. **s-block:** The elements of Group 1 (alkali metals) and Group 2 (alkaline earth metals) are called s-block elements because in them s-sub shell of outermost shell is being filled.
ii. **p-block:** The elements of Group 13 to Group 18 (except He) have outermost electrons in the p-subshell.
iii. **d-block:** The elements of Group 3 to Group 12 have the outermost electrons in the d-subshell. The d block elements lie between the s and p blocks.
iv. **f-block:** The elements of lanthanides and actinides have outermost electrons in the f-subshell. f-block lies separate at the bottom of the periodic table.

Advantage of Blocks:-

These blocks are very helpful in studying the properties of elements. They highlight common characteristics within each block, making it easier to understand trends in reactivity, electronegativity, and other chemical properties. By organizing elements this

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way, scientists can predict how different elements will behave in chemical reactions and interactions.

Q.3 (Ex. Q.4 (iii)) Explain the variation in the following properties in the periods giving reasons. (a)Atomic radius (b)Ionization energy

09208003



Ans. (a) Variations of Atomic Radius in Period

When we move from left to right in a period, the size of atoms decreases generally.

Reason:-

It is because as we move from lithium (Li) to neon (Ne) in the second period, we are adding electrons to the outermost shell. The charge on the nucleus also increases from +3 to +10. This tends to pull the electrons closer to the nucleus and hence the sizes of atoms decrease from lithium to neon as shown in Table data.

Atomic Radii of Second Period Elements

2nd period elements	Li	Be	B	C	N	O	F	Ne
Atomic radii (pm)	152	113	88	77	75	73	71	69

(b)Variation of Ionization Energy in Period

As you move from left to right across a period, ionization energy generally increases.

Reasons:

- As you move to the right, the number of protons in the nucleus increases. This increase in nuclear charge, leading to an increase in ionization energy.
- The atomic radius decreases as you move from left to right across a period. A smaller atomic radius means that the outermost electrons are closer to the nucleus, experiencing a stronger attraction. This stronger attraction makes it harder to remove an electron, thus increasing the ionization energy.
- When moving from left to right, new electrons are added to the same energy level without the addition of new shells. This means that the shielding effect does not increase significantly. As a result, the outermost electrons feel a stronger attraction from the nucleus, which contributes to the increase in ionization energy.

2nd period elements	Li	Be	B	C	N	O	F	Ne
Ionization energy (kJ/mol)	520	899	801	1086	1402	1314	1681	2081

Q.4 (Ex. Q.4 (iv)) Which physical properties of elements may lead us to know what type of bond it will form?

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Ans. The physical properties of elements that can help us to understand the type of bond they will form include:

Electronegativity: This is a measure of how strongly an atom attracts electrons in a chemical bond. Two elements with a large difference in electronegativity values, are likely to form an ionic bond. For example, sodium (Na) has low electronegativity, while chlorine (Cl) has high electronegativity, leading to the formation of NaCl.

Ionization Energy: Elements with low ionization energy tend to lose electrons easily and can form cations, which is common in ionic bonds. On the other hand, elements with high ionization energy are less likely to lose electrons and may form covalent bonds by sharing electrons.

Electron Affinity: Elements with high electron affinity tend to gain electrons easily, which is a characteristic of non-metals that often form anions in ionic bonds.

Metallic Character: Elements that are metals typically have lower electronegativity and low ionization energy, making them more likely to lose electrons and form metallic bonds with other metals.

By examining these properties, you can predict whether elements will form ionic, covalent, or metallic bonds based on their tendency to lose, gain, or share electrons.

Q.5 (Ex. Q.4 (v)) Write down the names of four non-metals which exist in solid state at normal temperature. 09208005

Ans. Four non-metals that exist in a solid state at normal temperature are:

(i) Phosphorus (P) (iii) Sulphur (S)

(ii) Iodine (I) (iv) Carbon (C)

Q.6 (Ex. Q.4 (vi) Why do second and third periods have equal number of elements while all other periods contain different number of elements? 09208006

Ans. Each period also represents the completion of a shell. Since the number of electrons to be accommodated in a particular shell is fixed, the number of elements in a period is also fixed. 2nd and 3rd periods have an equal number of elements, which is eight, is due to the way electrons fill the available energy levels or shells around the nucleus of an atom.

2nd Period

In the 2nd period, elements fill the 2s and 2p orbitals. The 2s orbital can hold 2 electrons and the 2p orbitals can hold 6 electrons, making a total of 8 electrons for the 2nd period.

3rd Period

Similarly, in the 3rd period, elements fill the 3s and 3p orbitals. Again, the 3s can hold 2 electrons and the 3p can hold 6 electrons, total making of 8 electrons for the 3rd period as well.

For periods beyond the 3rd, the number of elements varies because of the presence of d and f orbitals, which can hold more electrons. As a result, those periods can accommodate more elements, leading to differences in the number of elements in each period.

Investigative Questions

Q.1 (Ex. Q.5 (i)) Arrangement of the elements in the form of a periodic table is a remarkable achievement of chemists. Comment on this statement citing the benefit of this table. 09208007

Ans. The periodic table is indeed a remarkable achievement of chemists. This table organizes all the known elements based on their atomic number, electronic configuration, and chemical properties. The benefits of this table are numerous:

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Element Organization: The periodic table organizes elements in a systematic way, making it easier to understand and predict their properties based on their position.

Identification of Trends: The table allows chemists to identify trends in properties such as atomic size, electronegativity and reactivity as you move across a period or down a group.

Predictive Capabilities: By using the periodic table, scientists can predict the properties of undiscovered elements and how they might react with other elements.

Chemical Bonding: It helps in understanding how elements bond with each other to form compounds based on their electronic configurations.

Q.2 (Ex. Q.5 (ii)) Both lithium and beryllium show behavior different from rest of the alkali and alkaline earth metals respectively. Can you think of the possible reasons for this difference?

09208008

Ans. Lithium and beryllium exhibit different behaviors compared to the rest of the alkali and alkaline earth metals respectively due to their unique characteristics.

Lithium (Li):

i. Lithium is the lightest metal in the alkali metal group.
ii. Lithium has a smaller atomic size and higher ionization energy compared to other alkali metals.
iii. Due to its small size and high ionization energy, lithium tends to form covalent compounds rather than purely ionic compounds like other alkali metals.

Beryllium (Be):

i. Beryllium is the lightest alkaline earth metal.
ii. Beryllium has a small atomic size and high ionization energy, similar to lithium.
iii. The small size and high ionization energy of beryllium make it less reactive and less likely to form ionic compounds compared to other alkaline earth metals.
iv. Beryllium forms covalent compounds and exhibits amphoteric behavior, meaning it can act as both an acid and a base.

Q.3 (Ex. Q.5 (iii)) Modern periodic table is the amended form of the earlier table developed by Mendeleev. Elaborate how these two tables are different from each other.

09208009

Ans.

The earlier table developed by Mendeleev and the modern periodic table have some differences:

Mendeleev's Table:

i. Mendeleev's table was based on atomic mass and chemical properties of elements.
ii. Mendeleev arranged only 63 known elements. Gaps were left in Mendeleev's table for undiscovered elements and he could predict the properties of these missing elements.
iii. Mendeleev's table had less organized groups and periods than in the modern periodic table.

Modern Periodic Table:

i. The modern periodic table is based on atomic number rather than atomic mass.
ii. Elements are arranged in increasing atomic number and grouped based on similar chemical properties.
iii. The modern periodic table has periods (rows) and groups (columns) that help in organizing elements based on their properties.
iv. The modern periodic table includes noble gases as a separate group, which was not part of Mendeleev's original table.

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v. The modern periodic table includes transition metals in a distinct block, which was not defined in Mendeleev's table.

SLO Based Additional Long Questions

Q1. Discuss in detail the periods in periodic table. 09208010

Ans. Definition:

The horizontal rows in the modern periodic table are called periods. There are seven periods in total.

Explanation:

Each period except the first starts with an alkali metal and ends at a noble gas. Each period also represent the completion of a shell. Since the number of electrons to be accommodated in a particular shell is fixed the number of elements in a period is also fixed.

Period No	Name of the Period	Number of Elements	Number of Shell being filed
1st	Short	2	1^{st}
2nd	Normal	8	2^{nd}
3rd	Normal	8	3^{rd}
4th	Long	18	4^{th}
5th	Long	18	5^{th}
6th	Very Long	32	6^{th}
7th	Incomplete	23	7^{th}

Arrangement of Lanthanides and Actinides:

In 6th and 7th periods, two series of fourteen elements each have been accommodated. Because of the space problem, these two series were placed at the bottom of the periodic table to keep it in a manageable and presentable from.

Lanthanides:

The first series starts after lanthanum (La = 57) and is called lanthanides.

Actinides:

The second series starts after actinium (Ac = 89) and it is called actinides.

Together the elements present in these two series are also called rare earths or f-block elements.

Q2. Discuss the groups in modern periodic table. 09208011

Ans. Definition:

The vertical columns present in the periodic table are called groups. There are in total eighteen groups.

Explanation:

Elements present in the group resemble one another in their chemical properties since they contain the same number of electrons in their outermost shell. Elements present in a group are also called a family and each group has also have been given a family name. The distribution of electrons in the outermost shells (electronic configuration) and other information about the groups are given below in the following Table

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Electronic Configuration of Elements in the Outermost Shell

Groups No	Family Name	Electronic Configuration In the Outermost Shell
1	Alkali metals	ns^1
2	Alkaline earth metals	ns^2
3 to 12	Transition metals	$nd^* ns^2$
13	Baron Family	$ns^2 np^1$
14	Carbon family	$ns^2 np^2$
15	Nitrogen family	$ns^2 np^3$
16	Oxygen family	$ns^2 np^4$
17	Halogen family	$ns^2 np^5$
18	Noble gas	$ns^2 np^6$

Normal Element: The groups 1 to 2 and 13 to 17 contain the normal elements. In the normal elements all the inner shells are completely filled while the outermost shell is incomplete.

Transition Element: The groups 3 to 12 are called transition elements and in these elements the inner sub-shells are in the process of completion.

Q3. Why the elements placed in same group show similar chemical properties?

09208012

Ans. The chemical properties of elements depend largely upon the number of electrons present in their outermost shells. Since in a group of the periodic table all the elements have the same number of electrons in the outermost shell they are expected to show similar chemical properties. For Example:

Alkali Metal: All elements of group 1 have one electron in their outermost shells so they show a strong tendency to use their electron forming cations. They are thus known as electropositive metals. These metals react vigorously with water producing hydrogen and giving alkali in the solution.

$$Na_{(s)} + H_2O_{(\ell)} \longrightarrow NaOH_{(aq)} + H_{2\,(g)}$$

Alkali

Oxides: Oxides of these metals are also strongly basic in nature. They are readily soluble in water giving alkalies

$$K_2O_{\,(s)} + H_2O_{(\ell)} \longrightarrow 2KOH_{\,(aq)}$$

Halides: Alkali metals also react with halogens giving halides

$$Na_{(s)} + Cl_{2(g)} \longrightarrow 2NaCl_{(s)}$$

Reactivity: The reactivity of alkali metals gradually increases down the group.

Alkaline Earth Metal: The second group elements also show a tendency to lose both of their outermost electrons forming dipositive ions

$$Mg_{\,(s)} \longrightarrow Mg^{2+}_{(s)} + 2e^-$$

The tendency to lose electrons down the group increases due to gradual increase in their atomic sizes.

Oxides: The oxides of these metals are also basic in nature and form alkalis in water.

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$$CaO_{(s)} + H_2O_{(\ell)} \longrightarrow Ca(OH)_{2(aq)}$$

Halogens: All elements in group 17 have ns^2, np^5 configuration in their outer shells. They show a strong tendency to gain one electron to become an anion. They are called electronegative elements. These elements are very reactive non-metals and form salts with metals. Hence they are called halogens (salt forming). Unlike alkali metals, the reactivity of halogens decreases down the group.

$$Cl_{2(g)} + 2e^- \longrightarrow 2Cl^-_{(g)}$$

$$Ca_{(s)} + Cl_{2(g)} \longrightarrow CaCl_{2(s)}$$

Group16: Elements present in group 16 have ns^2, np^5 configuration in their outermost shells so they have a tendency to accept two electrons to form a dinegative ion. Oxygen behaves as a strong electronegative element.

$$O_{2(g)} + 2e^- \longrightarrow 2O^{2-}_{(g)}$$

Q4. Describe how group number relate with charge of ions? 09208013

Ans. When we move from left to right in the periodic table the main group elements tend to form cations having a change equal to the group number For example group 1 elements form 1 + ions, group 2 elements forms 2 + ions and group 3 elements forms 3+ ions. The number of charges on the cations also corresponds to the number of electrons present in their outermost shells.

When we move from right to left in the periodic table elements often from atoms with a negative charge equal to the number of group towards the left side of the noble gases, **For example,** group 17 elements (which are located one group towards left to the noble gases) form 1-ions. The negative charges presents on these ions correspond to number of electrons which these groups need to complete their octets.

Variation of Periodic Properties in Periods and Groups

Q5. Define Atomic Radius. What are variations of atomic radius in the periodic table? 09208014

Ans. Definition:

Atomic radius is defined as half the distance between the nuclei of the two identical bonded atoms.

Units:

It is expressed in pm ($1pm = 10^{-12}$ m) as well as nm ($1nm = 10^{-9}$ m)

For example, the distance between the nuclei of two bonded carbon atoms is 154 pm. Half of this distance i.e. 77pm is, therefore, the radius of carbon atom. This is also called covalent radius of carbon atom.

Variation of Atomic Radius in Periods:

When we move from left to right in a period the size of atoms decreases generally

Reasons:

It is because as we go from lithium (Li) to neon (Ne) in the second period, we are adding electrons to the outermost shell. The charge on the nucleus also increases from +3 to +10. This tends to pull the electrons closer to the nucleus and hence the sizes of atoms decreases from lithium to neon.

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Atomic Radii of Second Period Elements

2nd period elements	Li	Be	B	C	N	O	F	Ne
Atomic Radii (pm)	152	113	88	77	75	73	71	69

Variation of Atomic Radius in Group:

The atomic radii of atoms increase from top to bottom in a group.

Reasons:

It is because a new shell is being added in the successive period down the group which increases the shielding effect.

Atomic Radii of First Group Elements

First Group Elements	No. Of electrons in the Inner Shells	Atomic Radius (pm)
Li	2	152
Na	10	186
K	18	227
Rb	36	248
Cs	54	265

Q6. Define electron affinity. Why it increases in a period and decrease in a group?

09208015

Ans. Definition:

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

For example, 328 $kJmol^{-1}$ energy is released when an electron enters in the fluorine atom.

$$F_{(g)} + e^- \longrightarrow F^{1-}_{(g)} \qquad \Delta H = -328 kJmol^{-1}$$

Variation of electron affinity in Period:

Electron affinity values are also related to the sizes of the atoms. The smaller the size of an atom, the higher the force of attraction with which the nucleus will attract the entering electron and hence higher is the value of electron affinity

Electron Affinities of Second Period Elements

2nd period elements	Li	Be	B	C	N	O	F
Electron Affinity (kJ mol^{-1})	-60	0	-29	-122	7	-141	-328

Variation of electron affinity in Group:

In a group the electron affinity values decrease from top to bottom because the sizes of atoms increase down the group.In a bigger atom, the nucleus will attract the incoming electron with a weaker force and hence the electron affinity will also be low.

Note: While first electron affinities can be negative, positive or zero, secord electron affinity are always positive.

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Q7. Explain metallic character and reactivity of elements in periodic table. 09208016

Ans. Definition:

The metallic character is the tendency of an element to lose electrons and form positive ions or cations

Variation in group:

Since the ionization energy decreases down the group, the elements have increased ability to lose electrons. For this reason both the metallic character and reactivity increase down the group.

Variation in period:

As we know from left to right in a period, the nuclear charge increases due to a gradual increase in the number of protons in the nucleus. Owing to this the valence electrons are pulled strongly by the nucleus making it difficult for the atoms to lose electrons. Hence the metallic character decreases in a period from left to right. The chemical reactivity gradually decreases as we move from left to right in a period.

Example: Aluminium and silicon are less reactive than sodium and magnesium. This is because the number of valence electrons increases, making it difficult to lose-electrons. Moving further right in a period towards non-metals, the chemical reactivity gradually increases.

Exercise Short Question

Q.1 Why was atomic number chosen to arrange the elements in the periodic table? 09208017

Ans. The elements in the periodic table are arranged in order of their increasing atomic number because the atomic number represents the number of protons in an atom. This arrangement allows elements with similar chemical properties to be grouped together in the same column, known as a group or family. The atomic number increases across each period from left to right, reflecting the increase in the number of protons.

This arrangement helps in understanding the trends in physical and chemical properties of elements and provides a systematic way to organize and study the elements.

Q.2 What is the significance of the word periodic? 09208018

Ans. The word "periodic" in the periodic table refers to the repeating pattern of properties that elements exhibit when they are arranged in order of increasing atomic number. This repeating pattern occurs in groups or periods, that is why it is called the periodic table.

Q.3 Why does the size of a period increase as we move down the periodic table? 09208019

Ans. As you go down, the number of electronic shells increases, Addition of d-sub shell elements or transition metals, presence of f-sub-shell lanthanide and actinide cause increase in period size.

Q.4 In a group, the elements have the same number of electrons in the outermost shell. Why is it so? 09208020

Ans. Elements in the same group have similar chemical properties because they have the same number of electrons in their outer shell. The number of electrons in valence shell determines how an element will interact chemically with other elements.

Q.5 Do you expect calcium to be more reactive than sodium? Give the reason of your answer. 09208021

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Ans. No, calcium less reactive than sodium because the atomic size of sodium is larger than calcium. Moreover, sodium has one electron in its outer shell while calcium has two electrons in its outer shell.

Q.6 Which element has the maximum atomic radius and which element has the minimum atomic radius in third period?

09208022

Ans. In the 3rd period, the element with the maximum atomic radius is sodium (186 pm) and the element with the minimum atomic radius is chlorine (79 pm).

Q.7 Why are the most electronegative elements present in sixth and seventh groups?

09208023

Ans. The most electronegative elements are found in the sixth (16^{th}) and seventh (17^{th}) groups, specifically oxygen and fluorine respectively because they have high effective nuclear charge due to smallest atomic sizes among rest of the elements in the respective groups.

Q.8 The first ionization energy value of magnesium is less than the second one. Give reasons?

09208024

Ans. Once the first electron is removed, the magnesium atom becomes a positively charged ion (Mg^+). This ion has a stronger positive charge which pulls the remaining electrons closer to the nucleus. As a result, the second electron is held more tightly, requiring more energy to remove it.

So, the increase in effective nuclear charge after the first ionization energy makes the second ionization energy significantly higher.

$Mg_{(s)} \rightarrow Mg^+ + e^-$ $\quad \Delta H = +737$ KJ/mol

$Mg^+_{(g)} \rightarrow Mg^{++} + e^-$ $\quad \Delta H = +1450$ KJ/mol

Q.9 Is it possible for two metals or two non-metals to form an ionic bond?

09208025

Ans. No, two metals cannot form ionic bond and two non-metals also cannot form ionic bond.

Two metals form metallic bond.

Q.10 Which element has the least value of ionization energy and which element has the highest value of electronegativity?

09208026

Ans. The element with the least value of ionization energy is caesium (377 KJ/mol), and the element with the highest value of electronegativity is fluorine (4.0).

Practice Exercise Questions

Q.11 The electronic configuration of the outermost shell of an element is s^2p^3. Find out period number and the group number of the element. In which block will you place this element?

09208027

Ans. Period Number: The number of the period corresponds to the energy level of the outermost electrons. In this case, since the p orbital is being filled, the element is in the 2nd energy level. Therefore, the period number is 2.

Group Number: The group number is determined by the number of valence electrons in the outermost shell. In this case, there are total 5 valence electrons (2 from the s orbital and 3 from the p orbital). Elements with 5 valence electrons are typically found in Group 15 (also known as Group VA) of the periodic table.

Block: The element with the electronic configuration $ns^2\ np^3$ will be placed in the p-block of the periodic table. Elements in the p-block have their outermost electrons in the p orbital.

Therefore, the element with the electron configuration $ns^2\ np^3$ is in Period-2, Group-15 (Group VA) and belongs to the p-block of the periodic table.

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Q.12 What is the group of the element having eight electrons in its outermost shell? In which physical state does this element exist? 09208028

Ans. Having eight electrons in the outermost shell indicates that the element is in Group 18 of the periodic table, also known as the **Noble Gases** group. Elements in Group 18 have a completely filled outermost shell, making them stable and unreactive.

As for the physical state in which this element exists, elements in Group 18 are known as Noble Gases, and they exist as gases at room temperature and pressure.

Q.13 An element belongs to sixth group and it is a gas. To which period does it belong? 09208029

Ans. The element belonging to the 6^{th} group will be in Period 2 of the periodic table.

Q.14 Baruim (Ba) is present in 2^{nd} group and 6^{th} period. Answer the following questions about this element. 09208030

i. Is it a metal or a non-metal?

Ans. Barium is metal.

ii. Will it be electropositive or electronegative?

Ans. Barium is electropositive in nature.

iii. What is the nature of its oxide?

Ans. Barium oxide is basic oxide.

iv. In which physical state you expect this element to exist?

Ans. Barium is expected to exist in a solid state at room temperature and pressure.

Q.15 In which group and period you expect to find an element with the largest atomic radius? 09208031

Ans. You would expect to find an element with the largest atomic radius in Group 1 and Period 7 of the periodic table.

Q.16 Can you predict the group number of the most electropositive and the most electronegative elements? 09208032

Ans. The most electropositive element is found in Group 1 and the most electronegative element is found in Group 17 of the periodic table.

Q.17 Choose among the following the element having the lowest ionization energy and the element with highest electron affinity. Also assign its group number and period number Li, K, O, F, Cl. 09208033

Ans. The element with the lowest ionization energy is potassium (K). The element with the highest electron affinity is fluorine (F).

Potassium (K) is in Group 1 and Period 4.

Fluorine (F) is in Group 17 and Period 2.

Q.18 Which two elements of the periodic table react to give: 09208034

i. A basic oxide and

ii. An acidic oxide?

i. Sodium oxide (Na_2O) is formed when sodium reacts with oxygen.

$$4\,Na_{(s)} + O_{2(g)} \rightarrow 2\,Na_2O$$

ii. Sulphur dioxide (SO_2) is formed when sulphur burns in the presence of oxygen.

$$S_{(s)} + O_{2(g)} \rightarrow SO_{2(g)}$$

So, sodium produces a basic oxide, while *sulphur produces an acidic oxide.*

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Modern Periodic Table

Q.19 Define periodic table. 09208035

Ans. The elements are arranged according to ascending order of their atomic numbers. From left to right in a horizontal row, properties of elements are found repeating after regular intervals. This results in the form of a table in which elements of similar properties are placed in the same vertical columns.

Q.20 What do you mean by groups and periods in the Periodic Table? 09208036

Ans. **Groups:** Vertical columns in the periodic table are called groups. They are studied from top to bottom. There are 18 groups in the periodic table.

Periods: Horizontal rows in the periodic table are called periods. They are studied from left to right. There are 7 periods in the periodic table.

Q.21 Why the properties of elements are different in period and same in group? 09208037

Ans. In the modern periodic table, the electronic configuration of the elements continues changing when we move from left to right in period. Due to this, the elements in a period show a gradual change in the properties while the elements in a group show similar properties due to having same electronic configuration of last shell electrons.

Q.22 What do you mean by periodicity? 09208038

Ans. The periodic table shows repetition of the properties of elements after regular intervals. The study of properties in a sequence is called periodicity in the properties of elements.

Salient Features of Modern Periodic Table

Q.23 Why lanthanides and actinides are placed at the bottom of the periodic tables? 09208038

Ans. In 6^{th} and 7^{th} periods, two series of fourteen elements each have been accommodated. Because of the space problem these two series were placed at the bottom of the periodic table to keep it in a manageable and presentable form. The first series starts after lanthanum (La=57) and it is called lanthanides The second series starts after actinium (Ac=89) and it is called actinides.

Q.24 Define lanthanides. To which period do they belong? 09208039

Ans. The elements which follow the Lanthanum with atomic number 58 to 71 are called lanthanides. They belong to 6^{th} period. The name of the series is based upon element named lanthanum.

Q.25 Define actinides. To which period do they belong? 09208040

Ans. The elements which follow the actinium having atomic number 90 to 103 are called actinides. They belong to 7^{th} period. The name of the series is based upon element named actinium.

Q.26 Define normal or representative elements. 09208041

Ans. Elements which belong to 's' and 'p' blocks are called normal or representative elements. In these elements all the inner shells are completely filled with electrons. Only their outermost shells are incomplete.

Q.27 Define transition elements. 09208042

Ans. Those elements which belong to 'd' and 'f' blocks are called transition elements. Their d – subshells or f – subshells are in the process of completion with electrons.

Q.28 Define s-block elements. 09208043

Ans. Group 1 and Group 2 elements have the electronic configuration that ends at s-subshell. Therefore, these elements are called s-block elements.

Q.29 Define p-block elements. 09208044

Ans. Elements in groups 13 – 18 (except He) are known as p-block elements because their electronic configuration ends at p-subshell.

Q.30 Define f-block elements. 09208045

Ans. Lanthanides and actinides are known as f-block elements since their valence electrons lie in f sub-shell.

Q.31 What are halogens? 09208046

Ans. All elements in group 17 have $ns^2\ np^5$ configuration in their outer shells. They show a strong tendency to gain one electron to become an anion. They are called electronegative elements. These elements are very reactive non-metals and form salt with metals. Hence they are called halogens (salt forming).

Example: F, Cℓ, Br, I

Q.32 What do you know about the elements of Group-16? 09208047

Ans. Elements present in group 16 have s^2, p^5 configuration in their outermost shell, so they have a tendency to accept two electrons to form a dinegative ion. Oxygen behaves as a strong electronegative element.

$$O_{2(g)} + 2e \longrightarrow 2O^{2-}{}_{(g)}$$

Q33. How many elements did Mendeleev arrange and what mistake did he make in his periodic table? 09208048

Ans. Mendeleev arranged only 63 elements in his periodic table because only these elements were discovered at that time. He left many space vacant for those elements which were yet to be discovered.

Q34. How many total versions of periodic table and what are they? 09208049

Ans. EG. Mazurs collected 700 different published versions of the periodic table. Many forms retain the regular rectangular structure. Some forms had spirals circles and triangular shapes.

Similarities in the Chemical Properties of Elements in the Same Group

Q35. Why the elements with similar chemical properties placed in the same group? 09208050

Ans. The chemical properties of elements depend largely upon the number of electrons present in their outermost shells. Since in a group of the periodic table all the elements have the same number of electrons in the outermost shell they are expected to show similar chemical properties.

Q.36 What do you mean by group number and period number? 09208051

Ans. Ans. **Group Number:** It tells about the number of electrons present in the outermost shell of an atom.

Period Number: It tells about the number of electronic shells present in an atom.

Variation of Periodic Properties in Periods and Groups

Q37. Is atomic size always increases by increasing atomic numbers? 09208052

Ans. Although you might expect atoms in become larger with the increase in their atomic numbers, this does not always occur because the size of atoms is determined by the diameter of its electron shells.

Q38. Describe the trends of electronegativity in a period and group. 09208053

Ans. It increases from left to right in a period and decreases from top to bottom in a group. Thus the most electronegative atoms are found at the top right-hand

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corner of the periodic table. The most electronegative atoms are F, O, N and Cl.

Q39. Which property explains why chemical reactions occur? 09208054

Ans. Electronegativity is one of the most well-known property for explaining why chemical reactions take place.

Q.40 Define atomic radius. Give example. 09208055

Ans. Atomic radius is defined as half the distance between the nuclei of two identical bonded atoms. It is expressed in pm($1pm=10^{-12}m$). For example, the distance between the nuclei of two bonded carbon atoms is 154 pm, Half of this distance i.e. 77pm is therefore the radius of carbon atom. This is also called covalent radius of carbon atom.

Q41. Why does atomic radius of elements increase down the group? 09208056

Ans. The atomic radius increases from top to bottom in a group.

Reason: Because the increase of more electronic shell in atoms of successive period decreases the effective nuclear charge.

Q42. What is the advantage of metallic character of metal? 09208057

Ans. Metallic character of a metal generally determines its level of reactivity.

Q.43 Why does the size of atoms decrease in a period? 09208058

Ans. In a period, the atomic radii gradually decreases form left to right. Because of increase of atomic number, the effective nuclear charge increases gradually left to right due to addition of one more proton in the nucleus of next every atom. This increased nuclear force pulls more strongly the outermost shell towards the nucleus.

Q.44 Define ionization energy. 09208059

Ans. The ionization energy is the amount of energy required to remove the most loosely bounded electron from the valence shell of an isolated gaseous atom. Its unit is $kJmol^{-1}$. Ionization energy of sodium is 496 $kJmol^{-1}$.

e.g.: $Na \rightarrow Na^+ + 1e^-$

$\Delta H = +496$ KJ/mol

Q.45 Why is the 2nd Ionization energy of an element higher than first one? 09208060

Ans. When an electron is removed from an atom, mono-positive ion is formed. Mono-positive ion has one extra proton than the number of electrons. Its nuclear charge attracts the remaining electrons more strongly. Hence more energy is needed to remove second electron. That is why 2nd I.E. has greater value.

Q.46 Give the trend of ionization energy in periodic table. 09208061

Ans. Along Group:

Ionization energy decreases while moving from top to bottom in a group.

Reason:

Because in group more and more shells lie between the valence shell and nucleus reduce the electrostatic force of attraction on valence electrons so they are taken away easily.

Along Period:

Ionization energy increases while moving from left to right in a period.

Reason: Because in period the size of atoms reduce and valence shell electrons are held strongly by the electrostatic force of attraction of nucleus.

Q.47 Define electron affinity. Write down its unit. 09208062

Ans. The amount of energy released when an electron is added up in the outermost shell of an isolated gaseous atom. Its unit is kJ/mol.

Example: Electron affinity of fluorine is $-328kJ/mol$.

$F + e^- \rightarrow F^-$ $\Delta H = -328\ kJ/mol$

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Q.48 Why does electron affinity decrease in a group? 09208063

Ans. Electron affinity decreases in a group because of increasing atomic size and shielding effect in a group.

Q.49 Why does electron affinity increase in a period? 09208064

Ans. Electron affinity increases in a period because of decrease in atomic size from left to right in a period.

Q.50 What is the difference b/w first and second electron affinities? 09208065

Ans: First electron affinity can be negative, positive or zero while second electron affinity is always positive.

Q.51 Define electronegativity. Write the electronegativity of Nitrogen and oxygen. 09208066

Ans. The ability of an atom to attract the shared pair of electrons towards itself in a molecule is called electronegativity. Electronegativity of Nitrogen is 3.0 while that of Oxygen is 3.4.

Metallic Character and Reactivity

Q.52 What do you know about electropositive metals/ alkali metals and their reactivity? 09208067

Ans. All elements of group I have one electron in their outermost shell, so they show a strong tendency to lose their valence electron forming cations. They are thus known as electropositive metals. These metals react vigorously with water producing hydrogen and giving alkali in the solution.

$$Na_{(s)} + H_2O_{(\ell)} \rightarrow NaOH_{(aq)} + H_{2(g)}$$

Alkali metals also react with halogens giving halides.

$$Na_{(s)} + Cl_{2(g)} \rightarrow 2NaCl_{(s)}$$

The reactivity of alkali metals gradually increases down the group.

Q.53 What do you know about alkaline earth metals? 09208068

Ans. The second group elements also show a tendency to lose both of their outermost electrons forming dispositive ions called alkaline earth metals.

$$Mg_{(s)} \rightarrow Mg^{2+}_{(g)} + 2e^-$$

Q.54 Why does reactivity of metals increase down the groups? 09208069

Ans. The reactivity of metals increase down the group because of increasing atomic size and decreasing ionization energy. As the atomic size increases down the group due to the addition of shells, it becomes easy to remove electron from the outermost shell of a metal which causes increased reactivity of metals.

Q.55 What is electropositivity? Explain with an example. 09208070

Ans. Electropositivity is the property of an element to readily lose its valence electrons and gain a positive charge. Metals are highly electropositive elements.

e.g. Sodium atom can lose 1 electorn to from a positive ion. $Na_{(s)} \rightarrow Na^+_{(g)} + 1e^-$

Q.56 Why does metallic character decrease along a period and increase in a group? 09208071

Ans. In a period: Atomic radius of elements decreases in a period so removal of electron becomes more difficult which results in decrease of metallic character.

In a group: Atomic radius and shielding increases down the group so removal of electron becomes easier which results in increase of metallic character.

Q.57 What is the trend of variation in densities of alkali metals? 09208072

Ans. Densities of alkali metals increase down the group in the periodic table due to increase in atomic masses.

Q.58 Why aluminum and silicon are less reactive than sodium and magnesium? 09208073

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Ans. Aluminum and silicon are less reactive than sodium and magnesium. This is because comparatively more number of valence electrons making it difficult to lose electrons.

Q.59 What is density. Write its trend. 09208074

Ans. It is mass of a substance in a unit volume. Density of elements generally increases from top to bottom in a group but varies less significantly from left to right in a period. It is expressed in g/cm^3.

Densities of First Group Elements

First group Elements density g/cm^3	Li	Na	K	Rb	Cs
	0.53	0.97	0.89	1.63	1.879

CONSTRUCTED RESPONSE QUESTIION

Q.1. (Ex 4 (i)) Suppose a new element is discovered. Where would you like to accommodate this element in the periodic table: 09208075

Ans. It would be placed in the periodic table according to its atomic number, which is determined by the number of protons in its nucleus.

If the new element has similar properties to existing elements, it would go in the same group.

For example, if it behaves like a metal, it might be placed in one of the groups on the left side. If it has properties similar to non-metals, it could be placed on the right side.

The specific location would also depend on its electron configuration and how it interacts with other elements.

Q.2 (Ex. 4 (ii)) What is the first element of the periodic table? Will it lose an electron or gain it? 09208076

Ans. The first element of the periodic table is hydrogen. It can either lose an electron to achieve a stable configuration like a metal or gain an electron to achieve a stable configuration like a non-metal.

Q.3 (Ex. 4 (iii)) Atomic radii of boron and aluminum are 88 pm and 125 pm respectively. Which element is expected to lose electron or electrons easily? 09208077

Ans. Aluminum is expected to lose electrons more easily than boron since it has a larger atomic radius and high shielding affect.

Q.4 (Ex. 4 (iv)) How would you find the atomic radius of an atom? 09208078

Ans. The atomic radius is typically measured as half of the distance between the nuclei of two bonded atoms of the same element. This distance can be determined experimentally using techniques like X-ray crystallography or calculated based on the element's properties.

Q.5 (Ex. 4 (v)) Why is it not possible for oxygen atom to accept three electrons to form O^{3-} ion like nitrogen which can accept electrons to form N^{3-}? 09208079

Ans. Oxygen atom cannot accept three electrons to form O^{3-} like nitrogen forming N^{3-} because the electronic configuration of oxygen (O) is $1s^2 2s^2 2p^4$. Oxygen typically gains 2 electrons to achieve a stable octet configuration, forming O^{2-}.

Nitrogen (N) has an electronic configuration of $1s^2 2s^2 2p^3$ and can accept 3 electrons to complete its octet and achieve a stable configuration, forming N^{3-}.

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Multiple Choice Questions (Exercise)

1. **In which period and group you will place the element which is an important part of the solar cell?** 09208080
   (a) Third period and fourth A group (Group 14)
   (b) Second period and fourth A group (Group 14)
   (c) Third prod and fifth A group (Group 15)
   (d) Third period and sixth A group (Group 16)
2. **Identify the electronic configuration of the outermost shell of transition metal.** 09208081
   (a) ns^2np^4 (b) nd xns^2
   (c) ns^2np^6 (d) ns^2np^5
3. **Which is the softest metal?** 09208082
   (a) Na (b) Ca
   (c) Aℓ (d) Zn
4. **A yellow solid element exists in allotropic forms which is also present in fossil fuel. Indicate the name.** 09208083
   (a) Carbon (b) Iodine
   (c) Aluminum (d) Sulphur
5. **How many electrons can nitrogen accept in its outermost shell?** 09208084
   (a) 2 (b) 3
   (c) 4 (d) 5
6. **Which element is the most reactive element?** 09208085
   (a) Oxygen (b) Chlorine
   (c) Fluorine (d) Nitrogen
7. **Which element has the highest melting point?** 09208086
   (a) Na (b) K
   (c) Rb (d) Cs
8. **In what order does the metallic character Change in the second group?** 09208087
   (a) Mg> Ca>Ba>Sr
   (b) Sr>Ba>Mg>Ca
   (c) Mg> Sr> Ca> Ba
   (d) Ba> Sr> Mg>Ca
9. **Which of the following best describe the correct order of oxygen, fluorine, and nitrogen's Atomic radii?** 09208088
   (a) O<F<N (b) N<F<O
   (c) F<O<N (d) O<N<F
10. **The element having less value of ionization energy and less value of electron affinity is likely to belong to:** 09208089
    (a) Group 1 (b) Group 13
    (c) Group 16 (d) Group 17

SLO Based Additional MCQ's

Modern Periodic Table

11. **When we move from left to right in a period, atomic size:** 09208090
    (a) Increases
    (b) Decreases
    (c) First increases then decreases
    (d) None of the above

Salient Features of Modern Periodic Table

12. **Number of periods in the periodic table are:** 09208091
    (a) 8 (b) 7
    (c) 16 (d) 5
13. **Which of the following groups contain alkaline earth metals?** 09208092
    (a) IA (b) IIA
    (c) VII A (d) VIIIA

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14. **Which of the following element belong to VIIIA?** 09208093
(a) Na (b) Mg
(c) Br (d) Xe

15. **Main group elements are arranged in ____ groups.** 09208094
(a) 6 (b) 7
(c) 8 (d) 10

16. **Period number of $^{27}_{13}Al$ is:** 09208095
(a) 1 (b) 2
(c) 3 (d) 4

17. **All the elements of Group IIA are less reactive than alkali metals. This is because these elements have:** 09208096
(a) High ionization energies
(b) Relatively greater atomic sizes
(c) Similar electronic configuration
(d) decreased nuclear charge

18. **The atomic radii of the elements in periodic table:** 09208097
(a) Increase from left to right in a period
(b) Increase from top to bottom in a group
(c) Do not change from left to right in a period
(d) Decrease from top to bottom in a group

19. **4th and 5th period of the long form of Periodic Table are called:** 09208098
(a) Short periods
(b) Normal periods
(c) Long periods
(d) Very long periods

20. **Which one of the following halogens has lowest electronegativity?** 09208099
(a) Fluorine (b) Chlorine
(c) Bromine (d) Iodine

21. **Transition elements are:** 09208100
(a) All gases (b) All metals
(c) All non-metals (d) All metalloids

22. **How many groups are present in the modern periodic table?** 09208101
(a) 8 (b) 10
(c) 15 (d) 18

23. **How many periods are present in the modern periodic table?** 09208102
(a) 7 (b) 8
(c) 10 (d) 12

24. **How many elements are present in 1st period?** 09208103
(a) 1 (b) 2
(c) 8 (d) 18

25. **How many elements are present in each 2nd & 3rd period?** 09208104
(a) 2 (b) 8
(c) 18 (d) 32

26. **How many elements are present in each 4th & 5th period?** 09208105
(a) 2 (b) 8
(c) 18 (d) 32

27. **How many elements are present in 6th period?** 09208106
(a) 2 (b) 8
(c) 18 (d) 32

28. **How many elements are present in 7th period?** 09208107
(a) 2 (b) 8
(c) 18 (d) 23

29. **How many blocks are present in modern periodic table?** 09208108
(a) 2 (b) 3 (c) 4 (d) 5

30. **Elements are classified into four blocks depending upon:** 09208109
(a) Shell (b) Sub-shell
(c) Atomic mass (d) Atomic number

31. **The elements of group 1 and 2 are placed in which block:** 09208110
(a) s (b) p (c) d (d) f

32. **Elements of groups 13 to 18 have their valence electrons in subshell:** 09208111
(a) s (b) p (c) d (d) f

33. **Which of the following elements is present in 1st period?** 09208112

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(a) Hydrogen (b) Helium
(c) Both a & b (d) None of these

34. Second and third periods are called: 09208113
(a) Normal periods
(b) 1st transition series
(c) 2nd transition series
(d) 3rd transition series

35. Which element is present in 2nd period? 09208114
(a) Lithium (b) Beryllium
(c) Boron (d) All of these

36. Elements with atomic no.58 to 71 are called: 09208115
(a) Lanthanides (b) Actinides
(c) Both a & b (d) None of these

37. Lanthanides belong to period: 09208116
(a) 4th (b) 5th (c) 6th (d) 7th

38. Elements with atomic no. 90 to 103 are called: 09208117
(a) Lanthanides (b) Actinides
(c) Both a & b (d) None of these

39. Actinides belong to period: 09208118
(a) 4th (b) 5th (c) 6th (d) 7th

40. Lanthanide series starts after the element: 09208119
(a) Lanthanum (b) Actinium
(c) Osmium (d) None of these

41. Atomic number of lanthanum is: 09208120
(a) 57 (b) 58
(c) 59 (d) 60

42. Actinide series starts after the element: 09208121
(a) Lanthanum (b) Actinium
(c) Osmium (d) Silver

43. Atomic number of actinium is: 09208122
(a) 57 (b) 60
(c) 80 (d) 89

44. Group number tells about the: 09208123
(a) Number of valence electrons
(b) Number of shells
(c) Both a & b
(d) None of the above

45. Period number tells about the: 09208124
(a) No. of valence electrons
(b) No. of electronic shells
(c) Both a & b
(d) None of the above

46. Which period of the modern periodic table is considered as incomplete period? 09208125
(a) 4th (b) 5th
(c) 6th (d) 7th

47. Which of the following elements is present in group IA? 09208126
(a) Hydrogen (b) Lithium
(c) Sodium (d) All of these

48. Elements of Group 1 are called: 09208127
(a) Alkali metals
(b) Alkaline earth metals
(c) Transition metals
(d) Halogen

49. How many electrons are present in the valence shell of group 1 elements? 09208128
(a) 1 (b) 2
(c) 3 (d) 4

50. 17th group elements are known as: 09208129
(a) Alkali metals
(b) Alkaline earth metals
(c) Halogens
(d) Noble gases

51. 17th group elements contain electrons in their outer most shell: 09208130
(a) 4 (b) 5
(c) 6 (d) 7

52. The elements of group 3 to 12 are called: 09208131
(a) Normal elements
(b) Transition elements
(c) Halogens
(d) Noble gases

53. All transition elements belong to: 09208132
(a) s & p block (b) d-block
(c) f-block (d) d & f block

54. The vertical columns present in the periodic table are called: 09208133

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(a) Groups (b) Periods
(c) Both a & b (d) None of these

55. The horizontal lines present in the periodic table are called: 09208134
(a) Groups (b) Periods
(c) Both a & b (d) None of these

56. Number of elements in each normal period are: 09208135
(a) 18 (b) 10
(c) 8 (d) 32

57. With the increase of atomic number, the number of electrons in an atom also: 09208136
(a) Increases
(b) Decreases
(c) First increases then decreases
(d) None of the above

58. Elements of group 13 to 18 have their valence electrons in subshell. 09208137
(a) s (b) p
(c) d (d) f

59. Which is strongest oxidizing agent? 09208138
(a) Fluorine (b) Chlorine
(c) Bromine (d) Iodine

60. The order of stability of hydrogen halides is: 09208139
(a) $HF > HCl > HBr > HI$
(b) $HF > HBr > HCl > HI$
(c) $HI > HBr > HCl > HF$
(d) $HCl > HI > HF > HBr$

61. Which halogen member exists in a liquid state at room temperature? 09208140
(a) Fluorine (b) Chlorine
(c) Bromine (d) Iodine

Similarities in the Chemical Properties of Elements in the Same Group

62. Elements of a period show properties: 09208141
(a) Same (b) Different
(c) Both a & b (d) None of these

63. The elements of a group show properties: 09208142
(a) Same (b) Different
(c) Both a & b (d) None of these

Variation of Periodic Properties in Periods and Group

64. The amount of energy given out when an electron is added to an atom is called: 09208143
(a) Lattice energy
(b) Ionization energy
(c) Electronegativity
(d) Electron affinity

65. Along the period, which one of the following decreases: 09208144
(a) Atomic radius
(b) Ionization energy
(c) Electron affinity
(d) electronegativity

66. Mark the incorrect statement about ionization energy: 09208145
(a) It is measured in $kJmol^{-1}$
(b) It is absorption of energy
(c) It decreased in a period
(d) it decreases in a group

67. Point out the incorrect statement about electron affinity: 09208146
(a) It is measured in $kJmol^{-1}$
(b) It involves release of energy
(c) It decreases in a period
(d) It decreases in a group

68. Unit of atomic size is: 09208147
(a) nm (b) pm
(c) $kJmol^{-1}$ (d) Both a & b

69. The distance between the nuclei of two carbon atoms in its elemental form is: 09208148
(a) 150 pm (b) 152 pm
(c) 154 pm (d) 156 pm

70. When we move from left to right in a period, atomic number: 09208149
(a) Increases (b) Decreases
(c) First increases then decreases
(d) None of the above

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71. **When we move from top to bottom in a group, atomic size:** 09208150
(a) Increases
(b) Decreases
(c) First increases then decreases
(d) None of the above

72. **The minimum amount of energy which is required to remove an electron from valence shell of the gaseous state of an atom is called:** 09208151
(a) Ionization energy
(b) Electron affinity
(c) Electronegativity
(d) Potential energy

73. **The unit of ionization energy is:** 09208152
(a) nm and pm (b) $kJmol^{-1}$
(c) Newton (d) Pascal

74. **When we move top to bottom in a group, ionization energy:** 09208153
(a) Increases
(b) decreases
(c) No effect
(d)None of these

75. **When we move from left to right in a period, ionization energy:** 09208154
(a) Increases (b) Decreases
(c) No effect (d) None of these

76. **The first ionization energy of sodium atom is:** 09208155
(a) $+496\ kJmol^{-1}$
(b) $-495.8\ kJmol^{-1}$
(c) $-490.6\ kJmol^{-1}$
(d) $-495.7\ kJmol^{-1}$

77. **Unit of electron affinity is:** 09208156
(a) pm (b) $kJmol$
(c) $kJmol^{-1}$ (d) Newton

78. **Electron affinity of fluorine in $kJmol^{-1}$ is:** 09208157
(a) 328 (b) −328
(c) −330 (d) −340

79. **The ability of an atom to attract the shared pair of electrons towards itself in a molecule is called:** 09208158
(a) Ionization energy
(b) Electron affinity
(c) Electronegativity
(d) Shielding effect

80. **Which one of the following halogens has highest electronegativity?** 09208159
(a) Iodine (b) Chlorine
(c) Fluorine (d) Bromine

81. **Electronegativity of oxygen is:** 09208160
(a) 3.1 (b) 3.3
(c) 3.2 (d) 3.4

82. **The electronegativity of carbon is:** 09208161
(a) 2.0 (b) 1.0
(c) 2.5 (d) 4.0

83. **The first ionization energy of oxygen:** 09208162
(a) +1314 (b) +1086
(c) +1000 (d) +1351

84. **The first ionization energy of Magnesium:** 09208163
(a) +1681 (b) +737
(c) +520 (d) +419

85. **The ionization energy of Potassium:** 09208164
(a) +520 KJ/mol
(b) +496 KJ/mol
(c) +419 KJ/mol
(d) + 403 KJ/mol

86. **The electron affinity of Carbon:** 09208165
(a) −71.7 (b) −122
(c) −349 (d) −295

Metallic Character and Reactivity

87. **Metals can form ions carrying charges:** 09208166
(a) Uni-positive
(b) Di-positive
(c) Tri-positive
(d) All of these

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88. **Pure alkali metals can be cut simply by knife but iron cannot because of alkali metals have:** 09208167
(a) Strong metallic bonding
(b) Weak metallic bonding
(c) Non-metallic bonding
(d) Moderate metallic bonding

89. **Metals lose their electrons easily because:** 09208168
(a) They are electronegativity
(b) They have electron affinity
(c) They are electropositive
(d) Good conductors of heat

90. **Metals are the elements which have:** 09208169
(a) Electropositive character
(b) Electronegative character
(c) Both a & b
(d) None of the above

91. **Which are good conductor of heat and electricity?** 09208170
(a) Metals
(b) Non-metals
(c) Metalloids
(d) All of these

92. **All metals bear:** 09208171
(a) Positive charge
(b) Negative charge
(c) Both a & b
(d) None of these

93. **Metals possess:** 09208172
(a) Ionic bond
(b) Covalent bond
(c) Co-ordinate Covalent bond
(d) Metallic bond

94. **Sodium metal has electrons:** 09208173
(a) 10 (b) 12 (c) 11 (d) 14

95. **Which group of elements has low ionization energies?** 09208174
(a) Alkali Metals
(b) Alkaline Earth Metals
(c) Halogens
(d) Noble Gases

96. **Platinum alloyed with which metal is used as catalyst in automobiles as catalytic convertor?** 09208175
(a) Palladium (b) Rhodium
(c) Gold (d) Both a & b

97. **Which one of the following is a metal?** 09208176
(a) Hydrogen (b) Carbon
(c) Nitrogen (d) Magnesium

98. **The heaviest metal is:** 09208177
(a) Iron (b) Platinum
(c) Osmium (d) Lead

99. **The density of sodium is:** 09208178
(a) $0.53\ g/cm^3$
(b) $1.63\ g/cm^3$
(c) $0.97\ g/cm^3$
(d) $1.00\ g/cm^3$

100. **The density of Caesium is:** 09208179
(a) $0.53\ g/cm^3$
(b) $1.63\ g/cm^3$
(c) $1.879\ g/cm^3$
(d) $1.00\ g/cm^3$

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Answer Key

1	a	2	b	3	a	4	d	5	b
6	c	7	c	8	b	9	c	10	a
11	b	12	b	13	b	14	d	15	c
16	c	17	a	18	b	19	c	20	d
21	b	22	d	23	a	24	b	25	b
26	c	27	d	28	d	29	c	30	b
31	a	32	b	33	c	34	a	35	d
36	a	37	c	38	b	39	d	40	a
41	a	42	b	43	d	44	a	45	b
46	d	47	d	48	a	49	a	50	c
51	d	52	b	53	b	54	a	55	b
56	c	57	a	58	b	59	a	60	a
61	c	62	b	63	a	64	d	65	a
66	c	67	c	68	b	69	c	70	a
71	a	72	a	73	b	74	b	75	a
76	a	77	c	78	b	79	c	80	c
81	d	82	c	83	a	84	b	85	c
86	b	87	d	88	b	89	c	90	a
91	a	92	a	93	d	94	c	95	a
96	d	97	d	98	c	99	c	100	c

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