PERIODIC TABLE

CLASS - 10

INTEXT QUESTIONS (1) - Page 5

1. Name the scientist who stated modern periodic law. What is a periodic table?

Answer :- Henry Moseley stated modern periodic law.

A tabular arrangement of elements in groups and periods highlighting the regular trends in properties of elements is called a periodic table.

2. Elements of Group 1 and Group 17 both have same valency. Explain.

Answer :- Group 1 elements have one electron in their valence shell and thus they lose one electron to attain stability.

Group 17 elements have seven electrons in their valence shell and thus they gain one electron to attain stability.

Due to this reason both of the group elements have valency one.

4. Periodicity is observed due to similar number of valence electrons.

5. How does the electronic configuration in atoms change

i) in a period

Number of shells remain same but no of electrons increases as we move from left to right in a period.

So, electronic configuration changes by one electron getting added in the valence shell upto the noble gas.

Eg :- Period 2

Li	Be	B	C	N	O	F	Ne
2,1	2,2	2,3	2,4	2,5	2,6	2,7	2,8

ii) in a group

As we move down in a group, no of shell increases, but the electronic configuration remains the same. Because all the elements in a same group have same no of valence electrons.

Eg :- Group 1

H	Li	Na	K
1	2,1	2,8,1	2,8,8,1

6. Correct the statements :-

i) Elements in the same period have the same valency.

Answer :- Elements in the same group have the same valency.

ii) Valency depends upon the number of shells in an atom.

Answer :- Valency depends upon the number of valence electrons in an atom.

iii) Copper and Zinc are representative elements.

Answer :- Copper and zinc are transition elements.

iv) Transition elements are placed at extreme right of the periodic table.

Answer :- Transition elements are placed at middle of the periodic table.

7. Name two elements in each case :-

i) Alkali metals = Sodium (Na) and Potassium (K)

ii) Alkaline earth metals = Magnesium (Mg) and Calcium (Ca)

iii) Halogens = Fluorine (F) and Chlorine (Cl)

iv) Inert gas = Helium (He) and Neon (Ne)

v) Transition element = Copper (Cu) and Zinc (Zn)

vi) Lanthanides = Lanthanum (La) and Cerium (Ce)

vii) Actinides = Actinium (Ac) and Thorium (Th)

8. What do you understand by ?

i) Periodicity :- The properties that reappear at regular intervals, or, there is a gradual variation at regular intervals are called periodic properties, and the phenomenon is known as 'periodicity' of elements.

ii) Typical Elements :- The third period elements summarise the properties of their respective groups and are called 'typical elements'.

Eg :- Na, Mg, Al, Si, P, S, Cl.

iii) Orbits :- 'Orbits' are certain definite circular paths where the electrons revolve around the nucleus.

9. Name two elements that you would expect to show chemical reactions similar to calcium. What is the basis of your choice?

Answer :- Magnesium (Mg) and Strontium (Sr).

Basis of the choice is :- i) All three elements have same valency.

ii) All of them form positive ion of valency 2.

iii) Same number of valence shell electrons.

10. Name the i) metals ii) non-metals iii) metalloids in the first twenty elements.

Answer :- i) Metals :- Lithium (Li), Beryllium (Be), Sodium (Na), Magnesium (Mg), Aluminium (Al), Potassium (K) and Calcium (Ca).

ii) Non-metals :- Hydrogen (H), Carbon (C), Nitrogen (N), Oxygen (O), Phosphorous (P), Sulphur (S), Fluorine (F) and Chlorine (Cl) ← Halogens
Helium (He), Neon (Ne) and Argon (Ar) ← Noble Gases.

iii) Metalloids :- Boron (B) and Silicon (Si)

11. Fluorine, chlorine and bromine are put in one group on the basis of their similar properties.
i) What are those similar properties?

Answer :- a) Electrons in the outermost orbit are same, i.e., electronic configuration is similar.

b) They have same valency.
c) They are good oxidising agents.
d) They are very reactive and are found in combined state.
e) They form negative ions carrying a single negative charge.

15. Name the type of elements, which have their :-
i) outermost shell complete :- Noble Gases, eg, Helium, Neon
ii) outermost shell incomplete :- Representative Elements, eg, Sodium, Calcium.
iii) two outermost shell incomplete :- Transition Elements, eg, Copper, Iron, Zinc.
iv) one electron short of octet :- Halogens, eg, Chlorine, fluorine.
v) two electrons in the outermost orbit :- Alkaline earth metals, eg, Beryllium, Calcium.

16. An element has 2 electrons in its N shell.
i) What is its atomic number? 20
ii) State its position in the periodic table. Group 2, Period 4
iii) Is it metal or non-metal? Metal
iv) State the name assigned to this group. Alkaline Earth Metal

17. Answer the following in respect of element $^{32}_{16}S$.

i) Give its electronic configuration :- 2,8,6

ii) To which group and period does it belong :-

Group 16, Period 3

iii) What is its valency ? 2

iv) Is it metal or non-metal ? Non-metal

v) Is it reducing or oxidising agent ? Oxidising agent

vi) Give its formulae with chlorine. SCl_6

INTEXT QUESTION - 2 - Page 10

1. What do you understand by atomic size ? State its unit.

Answer :- Atomic size is the distance between the centre of the nucleus of an atom and its outermost shell.

In a molecule, atomic size is half the internuclear distance between the combined atoms.

Unit :- Angstrom, Picometer

$1 A = 10^{-10} m$

$1 pm = 10^{-12} m$

2. Give the trends in atomic size on moving :-

i) down the group

Atomic size increases down the group.

ii) across the period

Atomic size decreases across the period from left to right.

3. Arrange the elements of 2nd and 3rd period in increasing order of their atomic size.

Answer :- Elements of 2nd Period :-

F < Ne < O < N < C < B < Be < Li

Elements of 3rd Period :-

Cl < Ar < S < P < Si < Al < Mg < Na

4. Why is the size of :-

(i) Neon greater than fluorine.

Answer :- Neon is an inert gas. The outermost shell of an inert gas is fully filled. They have maximum number of electrons and so the electronic repulsions are maximum. Hence, due to this repulsion the atomic size of Neon is greater than fluorine

ii) Sodium is greater than magnesium ?

Answer :- Number of shells in sodium and magnesium are same. Now, the number of electrons in sodium in the valence shell is one and number of electrons in magnesium in the valence shell is two. So, in magnesium the nuclear attraction is more and hence the atomic size decreases in case of magnesium than that of sodium.

5. Which is greater in size :-

i) an atom or a cation

Answer :- 'Size of an atom is greater than that of a cation.'

◉ Reason :- Cation is formed by the loss of electron, hence, number of proton becomes more than the number of electron in a cation. Hence, electrons are strongly attracted by the nucleus and are pulled inward. Hence, the size decreases.

ii) an atom or an anion.

Answer :- 'Size of an anion is greater than that of an atom.'

◉ Reason :- Anion is formed by the gain of electron, hence the number of electron becomes more than the number of proton. The effective positive charge in the nucleus is less, so less inward pull is experienced. Hence, the size expands.

iii) Fe^{2+} or Fe^{3+}

Answer :- 'Fe^{2+} is greater in size than Fe^{3+}.'

◉ Reason :- Fe^{2+} and Fe^{3+} both have same number of protons in them, but the number of electrons in Fe^{2+} is greater than that in Fe^{3+}. So, the nuclear attraction will be more in case of Fe^{3+} and its size decreases compared to Fe^{2+}.

6. Arrange :-

i) Be, Li, C, B, N, O, F (in increasing metallic character).

F < O < N < C < B < Be < Li

ii) Si, Na, Al, Mg, Cl, P, S (in increasing non-metallic character).

Na < Mg < Al < Si < P < S < Cl

7. State the trend in chemical reactivity :-

i) across the period left to right

On moving from left to right across the period, the chemical reactivity of the elements first decreases and then increases. In other words, for metals reactivity decreases across the period and for non-metals reactivity increases across the period.

Eg :- 3rd Period

Na Mg Al Si P S Cl

most reactive metal → reactivity decreases

least reactive

← reactivity increases most reactive non-metal

ii) down the group

For metals, down the group chemical reactivity increases, and, for non-metals down the group chemical reactivity decreases.

8. A metal 'M' forms an oxide of formulae M_2O_3. It belongs to 3rd period. Write the atomic number and valency of the metal.

Answer :- From the oxide of the metal, M_2O_3, the valency of the metal M is 3.

Atomic number of the metal of valency 3 and period 3 is 13, as the electronic configuration will be 2, 8, 3.

9. An element X belong to 4th Period and 17th group, state :-

i) No of valence electrons in it – 7

ii) Name of the element – Bromine (Br)

iii) Name of the family to which it belongs – Halogen

iv) Write the formulae of the compound formed when X reacts with $^{27}_{13}Y$ = 2, 8, 3

Valency of Y = 3

Valency of X = 1 ; So, formulae of the compound = YX_3

10. The given table shows elements with same number of electrons in its valence shell.

Elements	A	B	C
melting point	63	180	97