

State :-

i) whether these elements belong to same group or period

Answer :- The elements belong to same group because they have same number of valence electrons in the outermost shell.

ii) Arrange them in order of increasing metallic character.

Answer :- B < C < A, as the metallic character increases, the melting point decreases.

11. Which one of the following has the largest atomic radius?  
i) Sodium ii) Potassium iii) Magnesium iv) Aluminium

Answer :- ii) Potassium

12. Which one has the largest size?

i) Br ii) I iii) I<sup>-</sup> iv) Cl

Answer :- iii) I<sup>-</sup>

13. The metals of group 2 from top to bottom are Be, Mg, Ca, Sr and Ba

i) which one of these elements will form ions most readily and why?

Answer :- Barium (Ba) will form ions most readily.

For metals, as we move down the group chemical reactivity increases. This is because, as we move down the group tendency to lose electrons increases due to increase in atomic size.

ii) State the common feature in their electronic configuration?

Answer :- All of the metals in Group 2 have two electrons in their valence shell.

14. Write the number of protons, neutrons and electronic configuration of <sup>39</sup><sub>19</sub>K and <sup>31</sup><sub>15</sub>P. Also state their position in periodic table.

Answer :- <sup>39</sup><sub>19</sub>K :- Electronic configuration = 2, 8, 8, 1  
Number of protons = 19  
Number of neutrons = 20

<sup>31</sup><sub>15</sub>P :- Electronic configuration = 2, 8, 5  
Number of protons = 15  
Number of neutrons = 16

(23)  ${}^{39}_{19}\text{K}$  lies in Group 1, Period 4 and  ${}^{31}_{15}\text{P}$  lies in Group 15, Period 3.

15. The electronic configuration of an element T is 2, 8, 8, 1.

- What is the group number of T? 1
- What is the period number of T? 4
- How many valence electrons are there in an atom of T? 1
- What is the valency? 1
- Is it a metal or non-metal? Metal

16. i) The properties of the elements are a periodic function of their atomic number.

- Moving across a period of the Periodic table, the elements show increasing non-metallic character.
- The elements at the bottom of a group would be expected to show more metallic character than the elements at the top.
- The similarities in the properties of a group of elements are because they have the same number of outer electrons.

17. i) The size of a  $\text{Cl}^-$  ion is greater than the size of a Cl atom

→ Answer of Question Number 5(ii), Page 20

ii) Argon atom is bigger than chlorine atom.

→ Answer of Question Number 4(i), Page 19

iii) Ionisation potential of the element increases across a period

Answer :- Ionisation potential of an element depends on two factors:  
a) atomic size b) nuclear charge.

As we move across the period, atomic size decreases and nuclear charge increases. So, tendency to lose electrons decreases. Hence, more energy will be required to remove an electron from the element and make it positively charged. So, ionisation potential increases as we move across the period.

iv) Alkali metals are good reducing agents.

Answer :- Alkali metals have two electrons in their outermost shell. So, they have a tendency to lose electrons to attain the nearest noble gas configuration. Hence, they get oxidised and reduces others by losing electrons. So, they are good reducing agents.

18. Name the element which has :

- i) two shells, both of which are completely filled with electrons - Neon (Ne)
- ii) the electronic configuration 2, 8, 3 - Aluminium (Al)
- iii) a total of three shells which has five electrons in its valence shell - Phosphorous (P)
- iv) a total of four shells which has two electrons in the valence shell - Calcium (Ca)
- v) twice as many electrons in its 2nd shell as in its 1st shell - Carbon (C)

19i) State the number of elements in Period 1, 2 and 3 of the Periodic Table and name them.

Answer :- Period 1 = 2 elements

Hydrogen (H) and Helium (He)

Period 2 = 8 elements

Lithium (Li), Beryllium (Be), Boron (B), Carbon (C), Nitrogen (N), Oxygen (O), Fluorine (F) and Neon (Ne).

Period 3 = 8 elements

Sodium (Na), Magnesium (Mg), Aluminium (Al), Silicon (Si), Phosphorous (P), Sulphur (S), Chlorine (Cl) and Argon (Ar).

ii) What is the common feature of the electronic configuration of the elements at the end of Period 2 and 3?

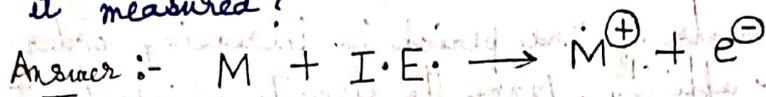
Answer :- At the end of Period 2 and 3, both the elements have a filled shell with eight electrons in their valence shell and thus both the elements are noble or inert gas.

iii) If an element is in Group 17, it is likely to be non-metallic in character, while with one electron in its outermost energy level, then it is likely to be metallic.

1(a) Define the term 'ionisation potential'.

Answer :- The energy required to remove an electron from a neutral isolated gaseous atom and convert it into a positively charged gaseous ion is called ionisation potential.

b) Represent it in the form of an equation. In which unit is it measured?



(Any element)

It is measured in electron volts per atom (eV/atom) or kilojoule per mole (kJ/mole).

2. Ionisation potential values depends on :-  
i) atomic size ii) nuclear pull. Explain.

Answer :- Ionisation potential depends on two factors :-

i) Atomic size :- As atomic size increases the force of attraction gradually decreases because the electrons of the outermost shell goes further away from the nucleus. Hence, removing an electron becomes easier and the I.E. value decreases.

ii) Nuclear pull :- Greater the nuclear pull or nuclear charge, greater is the attraction for the electrons of the outermost shell. Hence, it becomes difficult to remove an electron and I.E. value increases.

3. State the trends in I.E. a) across the period b) down the group.

Answer :- a) I.E. value increases across the period.

b) I.E. value decreases down the group.

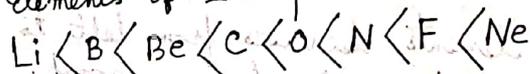
4. Name the elements with highest and lowest I.E. in first three periods.

Answer :- Element with highest I.E. = Helium (He)

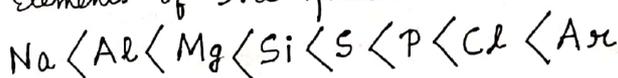
Element with lowest I.E. = Sodium (Na)

5. Arrange the elements of second and third period in increasing order of I.E.

Answer :- Elements of 2nd period :-



Elements of 3rd period :-



6a) Define the term 'electron affinity'. State its unit.

Answer :- The amount of energy released while converting a neutral gaseous isolated atom into a negatively charged gaseous ion by the addition of electron is called electron affinity.

Unit :- eV/atom, or, KJ/mole

b) Arrange the elements of 2nd period in increasing order of their electron affinity. Name the elements which donot follow the trend.

Answer :-  $\text{Li} < \text{B} < \text{C} < \text{O} < \text{F}$

Be and N donot show negative value of electron affinity. They are exceptions.

Inert gas (Ne) have zero electron affinity due to the stable electronic configuration.

7. Electron affinity values generally increases across the period left to right and decreases down the group top to bottom.

8a) Define the term electronegativity. State its unit.

Answer :- The tendency of an atom in a molecule to attract the shared pair of electrons towards itself, is called its electronegativity.

Electronegativity is a dimensionless property, It has no unit.

b) The element with least electronegativity Caesium.

9. Explain the following :-

a) Group 17 elements are strong non-metals, while group 1 elements are strong metals.

Answer :- Group 17 elements have 7 electrons in their outermost shell, so to attain stability they need to gain one electron. Hence, they are strong non-metals.

But, Group 1 elements have 1 electron in their outermost shell, so to attain stability they need to lose one electron. Hence, they are strong metals.

b) Metallic character of elements decreases from left to right in a period while it increases in moving down a group.

Answer :- Metals are those elements which have a tendency to lose electrons and form positively charged ions.

As we move across the period atomic size decreases and nuclear charge increases. So, the electrons in the valence shell are strongly held by the nucleus and it becomes difficult to remove one electron. Hence, metallic character decreases across a period.

But as we move down the group, atomic size of the element increases as one extra shell is added and it becomes easier to remove one electron from the outermost shell. So, metallic character increases down the group.

c) Halogens have high electron affinity.

Answer :- Electron affinity is the amount of energy released due to addition of one electron in a neutral gaseous atom. Now, more easily an electron added to an atom, more will be the amount of energy released.

For halogens, there are 7 electrons in the outermost shell, so, to attain stability they require only one electron to get added. Hence, they easily accept the electron and the electron is tightly held by the nucleus. Due to this a large amount of energy is released and halogens have high electron affinity.

d) The reducing power of element increases down the group while decreases across the period.

Answer :- Elements which lose electron easily are called reducing agents.

Across the period, nuclear pull increases due to the increase in atomic number and thus the atomic size decreases. Hence, elements can't lose electrons easily and the reducing power decreases.

Down the group, atomic size and nuclear charge both increases. But the effect of atomic size is greater, so, elements can lose electrons easily and the reducing power increases.

e) Size of atoms progressively becomes smaller when we move from sodium (Na) to chlorine (Cl) in the 3rd Period of the Periodic Table.

Answer :- As we move across the period from left to right, atomic number and so the nuclear charge increases but the number of shells remains the same. So, the outermost shell comes closer to the nucleus and the atomic size decreases.