

CHAPTER 5

Periodic Classification of Elements

1. OBJECTIVE QUESTIONS

1. According to Mendeleev's periodic law, the properties of elements are periodic function of their-
 (a) atomic masses (b) atomic numbers
 (c) atomic volumes (d) densities

Ans : (a) atomic masses

2. If the two members of a Dobereiner triad are phosphorus and antimony, the third member of this triad is-
 (a) arsenic (b) sulphur
 (c) iodine (d) calcium

Ans : (a) arsenic

3. Select the correct pair that have largest and smallest atoms respectively
 (a) F and C (b) Li and C
 (c) N and O (d) H and Li

Ans : (b) Li and C

The first element in any period has largest size in that period. The size decreases as we move from left to right in any period. Hence, lithium (Li) has largest size, while carbon (C) has smallest size among the given options.

4. Consider the section of the periodic table

Group number	IA	IIA	IIIA	IVA
Period	1	2	13	14
Second	Li		C	
Third	A	Mg	Al	Si
Fourth	K	B		D

Identify A, B, C and D.

	A	B	C	D
(a)	Cs	Be	Ca	C
(b)	Na	Ca	B	Ge
(c)	Na	B	Ca	Ge
(d)	Cs	B	Ca	C

Ans : (b) A-Na, B-Ca, C-B, D-Ge

	A = Na	B = Ca	C = B	D = Ge
Period	1	2	13	14

	Li	Be	B	C
	Na	Mg	Al	Si
	K	Ca	Ga	Ge

5. The correct order increasing acidic nature of SO_2 , SiO_2 , P_2O_5 and Al_2O_3 is
 (a) $\text{Al}_2\text{O}_3 < \text{SiO}_2 < \text{P}_2\text{O}_5 < \text{SO}_2$
 (b) $\text{SO}_2 < \text{P}_2\text{O}_5 < \text{SiO}_2 < \text{Al}_2\text{O}_3$
 (c) $\text{Al}_2\text{O}_3 < \text{SiO}_2 < \text{P}_2\text{O}_5 < \text{SO}_2$
 (d) $\text{SiO}_2 < \text{SO}_2 < \text{Al}_2\text{O}_3 < \text{P}_2\text{O}_5$

Ans : (c) $\text{Al}_2\text{O}_3 < \text{SiO}_2 < \text{P}_2\text{O}_5 < \text{SO}_2$

Al forms amphoteric oxide. Non-metals (S, P) form acidic oxide. Metalloid (Si) forms basic oxide.

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6. How many periods are there in the long form of the periodic table-
 (a) 6 (b) 7
 (c) 8 (d) 9

Ans : (b) 7

7. Elements belonging to the same group have similar properties because-
 (a) they have similar electronic configuration of the outermost shell
 (b) their atomic numbers go on increasing as we move down the group
 (c) all of them metallic elements
 (d) none of the above

Ans : (a) they have similar electronic configuration of the outermost shell

8. Which of the following will not represent Dobereiner's triad?
 (a) Li, Na, K (b) Be, Mg, Ca
 (c) Cl, Br, I (d) N, P, As

Ans : (d) N, P, As

The triad N, P and As will not represent the Dobereiner's triad because the average of atomic masses of nitrogen (N) and arsenic (As) is not equal to the atomic mass of phosphorus (P).

Atomic mass of Nitrogen = 14

Atomic mass of Arsenic = 74.9

$$\text{Average} = \frac{74.9 + 14.0}{2} \approx 44.5$$

Which of not equal to the atomic mass of P (i.e., 31.0).

9. The element with smallest size in the 4th period is-
 (a) chlorine (b) iodine
 (c) fluorine (d) bromine

Ans : (d) bromine

On moving along a period atomic radii decreases.

10. Cl, Br, I, if this is Dobereiner's triad and the atomic masses of Cl and I are 35.5 and 127 respectively the atomic mass of Br is-
 (a) 162.5 (b) 91.5
 (c) 81.25 (d) 45.625

Ans : (c) 81.25

According to Dobereiner's triad the atomic mass of Br will be average of the atomic masses of Cl and I

$$= \frac{35.5 + 127}{2} = 81.25$$

11. Which of the following element if not the member of second period?
 (a) Li (b) Ca
 (c) F (d) C

Ans : (b) Ca

The member of the second-period elements are Li, Be, B, C, N, O, F and Ne. Thus, calcium (Ca) is not the member of second period. It belongs to 4th period ($Z = 20$).

12. The elements with atomic number 2, 10, 18, 36, 54 and 86 are all-
 (a) halogens (b) noble gases
 (c) noble metals (d) light metals

Ans : (b) noble gases

13. Which of the following statement is incorrect for atomic size?
 (a) Atomic size of B > Be
 (b) Atomic size of Be > B
 (c) Atomic size of N > O
 (d) Atomic size of C > N

Ans : (a) Atomic size of B > Be

In long form of periodic table, atomic size decreases along the period, as we move from left to right in any period due to increase in effective nuclear charge. Thus, atomic size of B is less than of Be. Hence, (a) is the incorrect statement.

14. An element X belongs to group 2 and period 3 of the periodic table. The chemical formulae of its nitrate,

sulphate and phosphate respectively will be

- (a) $X(\text{NO}_3)_2$, $X_2(\text{SO}_4)_3$, $X_3(\text{PO}_4)_2$
 (b) $X_2(\text{NO}_3)_3$, $X_3(\text{SO}_4)_2$, $X_2(\text{PO}_4)_3$
 (c) $X\text{NO}_3$, $X\text{SO}_4$, $X\text{PO}_4$
 (d) $X(\text{NO}_3)_3$, $X\text{SO}_4$, $X_3(\text{PO}_4)_2$

Ans : (d) $X(\text{NO}_3)_3$, $X\text{SO}_4$, $X_3(\text{PO}_4)_2$

An element X belongs to group 2 and period 3. So, it is Mg which is divalent. Thus, the chemical formulae of nitrate is $\text{Mg}^{+2}(\text{NO}_3^-)_2$, sulphate is $\text{Mg}^{+2}\text{SO}_4^{2-}$ and phosphate is $\text{Mg}^{+2}(\text{PO}_4^{3-})_2$.

15. An element belongs to group 17. It is present in third period and its atomic number is 17. What is the atomic number of the element belonging to same group and present in fifth period?
 (a) 25 (b) 33
 (c) 35 (d) 53

Ans : (d) 53

Group 17 and 3rd period = 17 (Cl)

Group 17 and 4th period = 17 + 8 (35)

Group 17 and 5th period = 35 + 18 (53)

16. Consider the following figure:

p	q	r
Ru	Rh	s
Os	Ir	Pt

Here, p, q, r and s respectively are:

- (a) Fe, Co, Pd, Ni (b) Pd, Co, Ni, Fe
 (c) Fe, Co, Ni, Pd (d) Fe, Ni, Co, Pd

Ans : (c) Fe, Co, Ni, Pd

Group	8	9	10k
Period			
4	Fe	Co	Ni
5	Ru	Rh	Pd
6	Os	Ir	Pt

17. Which of the following property increases down the group?
 (a) Electronegativity
 (b) Electropositive nature of element
 (c) Atomic size
 (d) Both (b) and (c)

Ans : (d) Both (b) and (c)

Electronegativity decreases, as we move down the group, while electropositive nature and atomic size increases as we move down the group due to addition of an extra main shell.

18. The correct order of first IE of C, N, O, F is-
 (a) $\text{F} > \text{O} > \text{N} > \text{C}$ (b) $\text{C} > \text{N} > \text{O} > \text{F}$
 (c) $\text{O} > \text{N} > \text{F} > \text{C}$ (d) $\text{F} > \text{N} > \text{O} > \text{C}$

Ans : (d) $\text{F} > \text{N} > \text{O} > \text{C}$

In a period, the value of ionisation potential increases from left to right with breaks where the atoms have

some what stable configurations hence the correct order will be $F > N > O > C$

19. The atoms of elements belonging to the same group of periodic table have the same-
- number of protons
 - number of electrons
 - number of neutrons
 - number of electrons in the outermost shell

Ans : (d) number of electrons in the outermost shell

20. Which of the following is the correct order of relative size

- $I^- > I > I^+$
- $I^- > I > I^+$
- $I > I^- > I^+$
- $I^+ > I^- > I$

Ans : (b) $I^- > I > I^+$

21. Newlands could classify elements only upto-

- copper
- chlorine
- calcium
- chromium

Ans : (c) calcium

22. Mendeleev classified elements in-

- increasing order of atomic groups
- eight periods and eight groups
- seven periods and nine groups
- eight periods and seven groups

Ans : (c) seven periods and nine groups

23. An element M has an atomic number 9 and atomic mass 17. Its ion will be represented by-

- M
- M^{+2}
- M^-
- M^{-2}

Ans : (c) M^-

The element is halogen and has one less electron than inert gas configuration, hence can be represented as M^- ion.

24. Listed below are the locations of certain elements in group and periods of the periodic table.

Arrange these elements in the expected order of increasing non-metallic character.

- Element in the fourth period and group IV A
- Element in the third period and group VI A
- Element in the fourth period and group VI A
- Element in the six period and group III A
- Element in the second period and group VII A

The correct order is:

- $1 < 2 < 3 < 4 < 5$
- $5 < 4 < 3 < 2 < 1$
- $4 < 1 < 3 < 2 < 5$
- $5 < 4 < 2 < 1 < 3$

Ans : (c) $4 < 1 < 3 < 2 < 5$

Group	III A	IV A	V A	VI A	VII A	VIII A
Period.						
1.						
2.						5
3.				2		

4.		1		3		
5.						
6.	4					

Non-metallic character decreases down the group and increases across the period. Hence, increasing order of first non-metallic of these elements are:

$4 < 1 < 3 < 2 < 5$

25. The elements with atomic numbers 3, 11, 19, 37 and 55 belong to

- alkali metals
- alkaline earth metals
- halogens
- noble gases

Ans : (a) alkali metals

26. If the two members of a Dobereiner triad are chlorine and iodine, the third member of this triad is-

- fluorine
- bromine
- sodium
- calcium

Ans : (b) bromine

27. The most metallic element in the fifth period is-

- silver
- rubidium
- gold
- rhodium

Ans : (b) rubidium

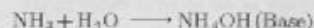
The metallic character decreases as we move from left to right in a period.

28. An element X combines with hydrogen to form a compound XH_3 . The element X is placed on the right side of the periodic table. Which of the following statement is correct for element X ?

- Has two valence electrons.
 - Is a metal and is solid.
 - Is a non-metal and is a gas.
 - Has five valence electrons.
 - XH_3 reacts with water to form a basic compound.
- 1, 2 and 3
 - 2, 3 and 4
 - 3, 4 and 5
 - 5, 1 and 2

Ans : (c) 3, 4 and 5

Element X is N(nitrogen) because it is placed on the right side of the periodic table and the compound is NH_3 . X is non-metal and valence electrons are 5.



29. Noble gases were included in Mendeleev's periodic table in the-

- 1st group
- 7th group
- 8th group
- none of these

Ans : (d) none of these

30. In the modern periodic table one of the following does not have appropriate position-

- transition elements
- inert gases
- inner transition elements
- halogens

Ans : (c) inner transition elements

31. The element with the smallest size in the group 13 is-

- beryllium
- carbon

Chap 5 : Periodic Classification of Elements

(c) aluminium (d) boron

Ans : (b) carbon

32. The long form of periodic table consists of-
- (a) seven periods and eight groups
 - (b) seven periods and eighteen groups
 - (c) eight periods and eighteen groups
 - (d) eighteen periods and eight groups
- Ans : (b) seven periods and eighteen groups

2. FILL IN THE BLANK

1. Dobereiner grouped the elements into triads and Newlands gave the
Ans : Law of Octaves.
2. The law of triads was given by
Ans : Dobereiner
3. Valency of an element is either equal to the number of valence electrons show similar properties.
Ans : eight, chemical
4. According to Modern periodic law, the elements are arranged in the periodic table in the order of their increasing
Ans : Atomic number
5. Mendeleev arranged the elements in increasing order of their and according to their properties.
Ans : Atomic masses, Chemical
6. arranged the known elements in order of their increasing atomic weight in the form of a table called Periodic Table.
Ans : Mendeleev
7. The elements in groups, 1, 2 and 13 to 18 are known as elements.
Ans : Main group
8. The valency of an atom is equal to its
Ans : Combining capacity
9. showed that group of three elements called triad had similar properties.
Ans : Dobereiner
10. The atomic size in a period
Ans : Decreases
11. Mendeleev predicted the existence of some yet to be discovered elements on the basis of in his Periodic Table.
Ans : Gaps
12. Elements in the Modern Periodic Table are arranged

in vertical columns called and horizontal rows called

Ans : 18, groups, 7, periods

13. In Modern Periodic Table, there are horizontal rows called and vertical columns called
Ans : seven, periods, eighteen, groups
14. Elements with eight electrons in their outermost energy shell are called
Ans : Noble gases
15. Anomalies in arrangement of elements based on increasing atomic mass could be removed when element discovered by Moseley.
Ans : atomic
16. If two elements have the same number of valence electrons, then they belong to the same of the periodic table.
Ans : Group

3. TRUE/FALSE

1. As number of shells increases, atomic orbitals become larger and less stable.
Ans : True
2. Atomic radii decrease from left to right across a row of the periodic table.
Ans : True
3. Atomic radii increase from top to bottom down a column of the periodic table.
Ans : True
4. Fluorine has highest electron affinity in the periodic table.
Ans : True
5. Valency changes down the group.
Ans : False
6. The elements of group 17 are called halogens.
Ans : True
7. Along a period, acidic character of the oxide of the elements increases and their basic character decreases.
Ans : True
8. The elements X with atomic number 15 belongs to third period and group 15.
Ans : True
9. The number of shells increases in a given period from

left to right in the periodic table

Ans : False

The number of shells remain same in a given period.

10. The elements silicon, germanium and arsenic are called metalloids.

Ans : True

11. When Mendeleev started his work, 63 elements were known

Ans : True

12. Dobereiner could identify only three triads of elements. These are: Li, Na, K; Ca, Sr, Ba and Cl, Br, I

Ans : True

13. Elements are classified on the basis of similarities in their properties.

Ans : True

14. Rows in the periodic table are called periods.

Ans : True

Rows in the periodic table are called periods. The columns of the periodic table are called groups.

15. The columns of the periodic table are called groups.

Ans : True

16. You will find metals on the extreme right side of the periodic table.

Ans : False

Inert gases are found on the far right of the periodic table. Halogens are in the second group from the right. Metals of all types are found around the left and middle side of the periodic table. There may be alkali transition, or alkaline earth metals across the table.

17. Although the order of elements is based on atomic number, vertical families share similar chemical properties.

Ans : True

18. As nuclear charge increases, atomic orbitals become smaller and more stable.

Ans : True

19. Noble gases are placed extremely left in the periodic table.

Ans : False

Noble gases are placed extremely right in the periodic table.

20. Magnesium is more metallic in nature than sodium.

Ans : False

4. MATCHING QUESTIONS

DIRECTION : Each question contains statements given in

two columns which have to be matched. Statements (A, B, C, D) in column-I have to be matched with statements (p, q, r, s) in column II.

1. Column II give group to which element in column I belong match them correctly.

Column I		Column II	
(A)	Nitrogen	(p)	15
(B)	Aluminium	(q)	16
(C)	Chlorine	(r)	17
(D)	Oxygen	(s)	13

Ans : A-p, B-s, C-r, D-q

2. Column II give period to which element in column I match them correctly.

Column I		Column II	
(A)	Hydrogen	(p)	3
(B)	Sodium	(q)	4
(C)	Calcium	(r)	6
(D)	Barium	(s)	1

Ans : A-s, B-p, C-q, D-r

3. Match the column-

Column I		Column II	
(A)	Element with largest size in second period	(p)	boron
(B)	Element with smallest size in group 13	(q)	fluorine
(C)	Element with maximum non-metallic character.	(r)	bromine
(D)	Element with smallest size in fourth period	(s)	lithium

Ans : A-s, B-p, C-q, D-r

DIRECTION : Following question has four statements (A, B, C and D...) given in Column I and four statements (p, q, r and s) in Column II. Any given statement in Column I can have correct matching with one or more statement (s) given in Column II. Match the entries in column I with entries in column II.

- 4.

Column I		Column II	
(A)	s-block elements	(p)	Alkali metals
(B)	p-block elements	(q)	Alkaline earth metals
(C)	Representative elements	(r)	Halogens

Column I		Column II	
(D)	High ionisation energy	(s)	Noble gases

	A	B	C	D
(a)	p, q	r, s	p, q, r	r, s
(b)	p, q	q	s, r	r, p
(c)	s	q, r	p, q	r
(d)	r, q	q	s, q	p, q, r

Ans : (a) A-p,q, B-r,s, C-p, q, r, D-r, s

5.

Column I		Column II	
(A)	He	(p)	P- block
(B)	Cl	(q)	Metal
(C)	Cu	(r)	Noble gas
(D)	Sn	(s)	Non-metal

	A	B	C	D
(a)	p, s	q	r, p	s
(b)	r	q, r	s	p, s
(c)	r	p, s	q	p, q
(d)	r, p	q, r	p, q	s

Ans : (c) A-r, B-p, s, C- q, D-p, q

6.

Column I		Column II	
(A)	Metals	(p)	High I.E.
(B)	Non-metals	(q)	Low I.E.
(C)	Transition Metal	(r)	High E.A.
(D)	Noble gases	(s)	Low E.A.

	A	B	C	D
(a)	q, r	p, s	q	p, r
(b)	p	q, s	s	r
(c)	q, r	s	p	p, r
(d)	r	q	q, s	p

Ans : (a) A-q, r, B-p, s C-q, D-p, r

7.

	Column A		Column B
1.	^{20}Ca	(a)	3^{rd}
2.	^8O	(b)	1^{st}
3.	^2He	(c)	2^{nd}
4.	^{17}Cl	(d)	4^{th}
5.	^{15}P		

Ans : 1-(d), 2-(c), 3-(b), 4-(a), 5-(a)

8.

	Column A		Column B
1.	^{11}Na	(a)	3
2.	^9F	(b)	4
3.	^{20}Ca	(c)	1
4.	^{13}Al	(d)	2
5.	^6C		
6.	^8O		

Ans : 1-(c), 2-(c), 3-(d), 4-(a), 5-(b), 6-(d)

5. ASSERTION AND REASON

DIRECTION : In the following questions, a statement of assertion (A) is followed by a statement of reason (R). Mark the correct choice as:

- Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).
- Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).
- Assertion (A) is true but reason (R) is false.
- Assertion (A) is false but reason (R) is true.
- Both Assertion and Reason are false.

- Assertion :** Mendeleev's left the gap under aluminium and silicon and called these Eka-aluminium and Eka-silicon, respectively.

Reason : Dobereiner arranged elements on the basis of increasing atomic number.

Ans : (c) Assertion (A) is true but reason (R) is false.

Dobereiner arranged elements on the basis of increasing atomic weights.

- Assertion :** According to Mendeleev, the properties of elements are a periodic function of their atomic masses.

Reason : Atomic number is equal to the number of protons.

Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

- Assertion :** Noble gases are also called inert gases.

Reason : Noble gases have a complete octet.

Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

Noble gases are also called inert gases because they don't need to react with other elements to fill their outer shell (octet), as they already possess full valence shell.

- Assertion :** Nitrogen has higher ionization energy than

that of oxygen

Reason : Nitrogen has smaller atomic size than that of oxygen.

Ans : (c) Assertion (A) is true but reason (R) is false.

Nitrogen has higher ionisation energy as it has stable half filled orbital structure.

5. **Assertion :** Electronegativity of fluorine is greater than that of oxygen.

Reason : The electronegativity of the elements increases along a period since the metallic character increases.

Ans : (c) Assertion (A) is true but reason (R) is false.

Assertion is true but reason is false. Electronegativity of fluorine is greater than that of oxygen, since the non-metallic character increases along a period from left to right in the modern periodic table.

6. **Assertion :** Be, Mg and Ca can be classified as Dobereiner's triads.

Reason : Atomic mass of Mg is approximately the average of the atomic masses of Be and Ca.

Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

According to the Dobereiner's triads, the three elements in a triad were arranged in the order of increasing atomic masses, the atomic mass of middle element was roughly the average of the atomic masses of the other two elements. So, taking Be, Mg and Ca as a triad.

Elements	Be	Mg	Ca
Atomic mass	9	24	40

Average atomic mass of first and third element

$$\frac{9+40}{2} = 24.5$$

7. **Assertion :** The elements of the same group have similar chemical properties.

Reason : The elements of the same group have the different number of valence electronic.

Ans : (c) Assertion (A) is true but reason (R) is false.

Assertion is true but reason is false. The elements of same group have similar chemical properties due to the same number of valence electrons.

8. **Assertion :** Elements of group 16 are monovalent.

Reason : Elements of group 16 have seven electrons in their outermost/valence shell.

Ans : (e) Both Assertion and Reason are false.

Both Assertion and Reason are false. Elements of group 16 are divalent as they all have six electrons in their valence shell.

9. **Assertion :** Silicon is a metalloid.

Reason : Silicon shows only properties of non-metals.

Ans : (c) Assertion (A) is true but reason (R) is false.

10. **Assertion :** According to Mendeleev, periodic properties of elements is a function of their atomic

number.

Reason : Atomic number is equal to the number of protons.

Ans : (d) Assertion (A) is false but reason (R) is true.

According to Mendeleev, periodic properties of elements is a function of their atomic masses.

11. **Assertion :** Ionization enthalpy is the energy released to remove an electron from an isolated gaseous atom in its ground state.

Reason : Element has a tendency to lose or gain the electrons to attain the stable configuration.

Ans : (d) Assertion (A) is false but reason (R) is true.

Assertion is false but reason is true. Ionization enthalpy is the energy required to remove an electron from an isolated gaseous atom in its ground state.

12. **Assertion :** Group 1 (1s) elements are known as the alkali elements.

Reason : s-orbital can accommodate only two electrons.

Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

Group 1 elements are known as alkali metals as the hydroxides of these metals are soluble in water and these solutions are highly alkaline in nature.

13. **Assertion :** Noble gases have zero valency.

Reason : Noble gases have stable electronic configuration.

Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

14. **Assertion :** In triad, the three elements have same gaps of atomic masses.

Reason : Elements in a triad have similar properties.

Ans : (d) Assertion (A) is false but reason (R) is true.

In a triad, the atomic mass of the middle element is the mean of the atomic masses of the first and third elements.

15. **Assertion :** Sixth and seventh periods in the periodic table contains 14 elements

Reason : In the periodic table, 14 elements of sixth and seventh periods are known as lanthanoids and actinoids.

Ans : (d) Assertion (A) is false but reason (R) is true.

Sixth period contains 32 elements and seventh period is incomplete and like sixth, the period would have 32 elements.

16. **Assertion :** Mendeleev's arranged elements in horizontal rows and vertical columns.

Reason : Mendeleev's ignored the order of atomic weight thinking that the atomic measurements might be incorrect.

Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

Mendeleev's arranged elements in horizontal rows

and vertical columns. He ignored the order of atomic weight thinking that the atomic measurements might be incorrect and placed the elements with similar properties.

17. **Assertion :** Smaller the size of an atom greater is the electro-negativity.

Reason : Electronegativity refers to the tendency of atom to share electrons with other atom.

Ans : (c) Assertion (A) is true but reason (R) is false. Assertion is true but reason is false.

Electro-negativity refers to the tendency of atom to attract bonding electrons

18. **Assertion :** Fluorine has greater atomic radius than nitrogen.

Reason : Atomic radius decreases along a period.

Ans : (d) Assertion (A) is false but reason (R) is true.

19. **Assertion :** Elements in the same vertical column have similar properties.

Reason : Elements have periodic dependence upon the atomic number.

Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

20. **Assertion :** Smaller the size of an atom, greater is the electronegativity.

Reason : Electronegativity refers to the tendency of atom to share electrons with other atom.

Ans : (c) Assertion (A) is true but reason (R) is false.

Electronegativity refers to the tendency of atom to attract bonding electrons

21. **Assertion :** The atomic and ionic radii generally decreases towards right in a period.

Reason : The ionisation enthalpy increases on moving towards left in a period.

Ans : (c) Assertion (A) is true but reason (R) is false.

The ionisation enthalpy increases on moving towards the extreme right element in period and atomic and ionic radii decreases in a period from left to right.

22. **Assertion :** Elements in the same vertical column have similar properties.

Reason : Elements have periodic dependence upon the atomic number.

Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

23. **Assertion :** Be and Al show some similar properties.

Reason : The metallic radius of Be is less than the metallic radius of Al.

Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

Be and Al show diagonal relationship because Be resemble in their properties with Al. Metallic radius of the Be (111 pm) is less than the metallic radius of Al (143 pm). Although smaller size is the reason for

the anomalous behaviour of Be but not a reason for its diagonal relation with Al.

24. **Assertion :** According to Mendeleev, periodic properties of elements is a function of their atomic number.

Reason : Atomic number is equal to the number of protons.

Ans : (d) Assertion (A) is false but reason (R) is true.

According to Mendeleev' periodic properties of elements is a function of their atomic masses.

25. **Assertion :** The highest I.E. in a period is shown by noble gas.

Reason : Noble gases are at the extreme right of the period.

Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

Both assertion and reason are true but reason is not the correct explanation of assertion.

Noble gases have completely filled electron shells and very stable electron configuration.

26. **Assertion :** Noble gases are highly reactive.

Reason : Noble gases have stable closed shell electronic configuration.

Ans : (d) Assertion (A) is false but reason (R) is true.

Inert gases (noble gases) are very less reactive due to stable closed shell electronic configuration like $ns^2 np^6$ or ns^2 .

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