

PERIODIC TABLE

1. The electron gain enthalpy (in kJ/mol) of fluorine, chlorine, bromine and iodine, respectively are :
 - (1) - 333, - 349, - 325 and - 296
 - (2) -296, - 325, - 333 and - 349
 - (3) - 333, - 325, - 349 and - 296
 - (4) -349, - 333, - 325 and - 296
2. Within each pair of elements of F & Cl, S & Se, and Li & Na, respectively, the elements that release more energy upon an electron gain are
 - (1) F, Se and Na (2) F, S and Li
 - (3) Cl, S and Li (4) Cl, Se and Na
3. The first ionization energy (in kJ/mol) of Na, Mg, Al and Si respectively, are :
 - (1) 496, 737, 577, 786
 - (2) 786, 737, 577, 496
 - (3) 496, 577, 737, 786
 - (4) 496, 577, 786, 737
4. The increasing order of the atomic radii of the following elements is :-
 - (a) C (b) O (c) F (d) Cl
 - (e) Br
 - (1) (b) < (c) < (d) < (a) < (e)
 - (2) (a) < (b) < (c) < (d) < (e)
 - (3) (d) < (c) < (b) < (a) < (e)
 - (4) (c) < (b) < (a) < (d) < (e)
5. B has a smaller first ionization enthalpy than Be. Consider the following statements :
 - (I) It is easier to remove 2p electron than 2s electron
 - (II) 2p electron of B is more shielded from the nucleus by the inner core of electrons than the 2s electrons of Be.
 - (III) 2s electron has more penetration power than 2p electron.
 - (IV) atomic radius of B is more than Be (Atomic number B = 5, Be = 4)
 The correct statements are :
 - (1) (I), (II) and (III)
 - (2) (II), (III) and (IV)
 - (3) (I), (III) and (IV)
 - (4) (I), (II) and (IV)
6. The correct order of the ionic radii of O^{2-} , N^{3-} , F^- , Mg^{2+} , Na^+ and Al^{3+} is :
 - (1) $Al^{3+} < Na^+ < Mg^{2+} < O^{2-} < F^- < N^{3-}$
 - (2) $N^{3-} < O^{2-} < F^- < Na^+ < Mg^{2+} < Al^{3+}$
 - (3) $Al^{3+} < Mg^{2+} < Na^+ < F^- < O^{2-} < N^{3-}$
 - (4) $N^{3-} < F^- < O^{2-} < Mg^{2+} < Na^+ < Al^{3+}$
7. Lattice enthalpy and enthalpy of solution of NaCl are 788 kJ mol^{-1} and 4 kJ mol^{-1} , respectively. The hydration enthalpy of NaCl is :
 - (1) -780 kJ mol^{-1}
 - (2) -784 kJ mol^{-1}
 - (3) 780 kJ mol^{-1}
 - (4) 784 kJ mol^{-1}
8. The process that is NOT endothermic in nature is :-
 - (1) $Ar_{(g)} + e^- \rightarrow Ar_{(g)}^-$ (2) $H_{(g)} + e^- \rightarrow H_{(g)}^-$
 - (3) $Na_{(g)} \rightarrow Na_{(g)}^+ + e^-$ (4) $O_{(g)}^- + e^- \rightarrow O_{(g)}^{2-}$
9. The ionic radii of O_2^- , F^- , Na^+ and Mg^{2+} are in the order :
 - (1) $F^- > O_2^- > Na^+ > Mg^{2+}$
 - (2) $Mg^{2+} > Na^+ > F^- > O_2^-$
 - (3) $O_2^- > F^- > Mg^{2+} > Na^+$
 - (4) $O_2^- > F^- > Na^+ > Mg^{2+}$
10. The elements with atomic numbers 101 and 104 belong to, respectively :
 - (1) Group 11 and Group 4
 - (2) Actinoids and Group 4
 - (3) Actinoids and Group 6
 - (4) Group 6 and Actinoids
11. The five successive ionization enthalpies of an element are 800, 2427, 3658, 25024 and $32824 \text{ kJ mol}^{-1}$. The number of valence electrons in the element is :
 - (1) 2 (2) 3 (3) 4 (4) 5

12. Among the statements (I – IV), the correct ones are:
- (I) Be has smaller atomic radius compared to Mg.
(II) Be has higher ionization enthalpy than Al.
(III) Charge/radius ratio of Be is greater than that of Al.
(IV) Both Be and Al form mainly covalent compounds.
- (1) (I), (II) and (IV) (2) (II), (III) and (IV)
(3) (I), (II) and (III) (4) (I), (III) and (IV)
13. The atomic number of the element unnilennium is :
- (1) 119 (2) 108 (3) 102 (4) 109
14. Three elements X, Y and Z are in the 3rd period of the periodic table. The oxides of X, Y and Z, respectively, are basic, amphoteric and acidic. The correct order of the atomic numbers of X, Y and Z is :
- (1) $Z < Y < X$ (2) $X < Z < Y$
(3) $X < Y < Z$ (4) $Y < X < Z$
15. In general, the property (magnitudes only) that shows an opposite trend in comparison to other properties across a period is
- (1) Electronegativity
(2) Electron gain enthalpy
(3) Ionization enthalpy
(4) Atomic radius
16. The atomic number of Unnilunium is _____.

SOLUTION

1. NTA Ans. (1)

Sol. Order of electron gain enthalpy (magnitude) is
Cl > F > Br > I

2. NTA Ans. (3)

Sol. (i) Electron affinity of second period p-block element is less than third period p-block element due to small size of second period p-block element.

E.A. order : F < Cl

(ii) Down the group electron affinity decreases due to size increases.

EA. order : S > Se

Li > Na

3. NTA Ans. (1)

Sol. Electronic configuration of Na = [Ne] 3s¹

Mg = [Ne] 3s²

Al = [Ne] 3s²3p¹

Si = [Ne] 3s²3p²

So order of first ionisation energy is

$$\text{Na} < \underset{496}{\text{Mg}} > \underset{737}{\text{Al}} < \underset{577}{\text{Si}} < \underset{786}{\text{Si}} \text{ kJ/mol}$$

Na < Al < Mg < Si (IE₁ order)

4. NTA Ans. (4)

Sol. If the given elements are arranged according to their position in periodic table

Atomic radius

C > O > F

^

Cl

^

Br

Br > Cl > C > O > F

c < b < a < d < e

5. NTA Ans. (1)

Sol. Be ⇒ 1s² 2s²

B ⇒ 1s² 2s² 2p¹

B has a smaller size than Be

it is easier to remove 2p electron than 2s electron due to less penetration effect of 2p than 2s.

2p electron of Boron is more shielded from the nucleus by the inner core of electron than the 2s electron of Be

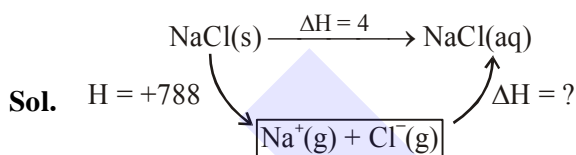
B has a smaller size than Be

6. Official Ans. by NTA (3)

Sol. Correct order of size for isoelectronic species.

Al³⁺ < Mg²⁺ < Na⁺ < F⁻ < O²⁻ < N³⁻

7. Official Ans. by NTA (2)



4 = 788 + ΔH

ΔH = -784 kJ

8. Official Ans. by NTA (2)

Sol. H_(g) + e⁻ → H⁻ is exothermic rest of all endothermic process.

9. Official Ans. by NTA (4)

Sol.	O ⁻²	F ⁻	Na ⁺	Mg ²⁺
z	8	9	11	12
e ⁻	10	10	10	10
$\frac{z}{e}$	0.8	0.9	1.1	1.2

as $\frac{z}{e}$ ratio increases size decreases.

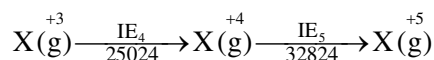
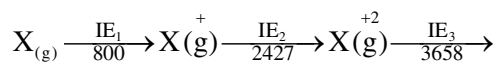
Thus correct ionic radii order is

O⁻² > F⁻ > Na⁺ > Mg²⁺

Therefore correct option is (4)

10. Official Ans. by NTA (2)

Sol. Element with atomic no. 101 is an Actinoid element.

11. Official Ans. by NTA (2)**Sol.** Let suppose element X \Rightarrow 

X^{+3} has stable inert gas configuration as there is high jump after IE_3

So valence electrons are 3

12. Official Ans. by NTA (3)**Sol.** I, A_N : Be < Mg

II IE : Be > Al

III Charge/radius ratio of Be is less than that of Al

IV Be, Al mainly form covalent compounds

13. Official Ans. by NTA (4)**Sol.** 1 0 9

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Hence correct name \rightarrow unnilennium**14. Official Ans. by NTA (3)****Sol.** When we are moving from left to right in a periodic table acidic character of oxides increases (as well as atomic number of atom increases)

$$\therefore X < Y < Z \quad (\text{acidic character})$$

$$X < Y < Z \quad (\text{atomic number})$$

15. Official Ans. by NTA (4)**Sol.** In general across a period atomic radius decreases while ionisation enthalpy, electron gain enthalpy and electronegativity increases because effective nuclear charge (Z_{eff}) increases.**16. Official Ans. by NTA (101.00)****Sol.** Unnilunium \Rightarrow 101