

## 2. Classification of Elements and periodicity in properties

### PREVIOUS EAMCET BITS

1. Which of the following order is correct for the first ionization energies of their elements. (2009 E)  
1)  $B < Be < N < O$    2)  $Be < B < N < O$    3)  $B < Be < O < N$    4)  $B < O < Be < N$

Ans: 3

Sol. IP values are  $B(8.3) < Be(9.3) < O(13.6) < N(14.5)$

2. Which one of the following is correct (2009 M)

- 1) Ionic radius of  $Fe^{3+}$  is greater than  $Fe^{2+}$
- 2) Atomic radius of chlorine atom is greater than the ionic radius of chloride ion
- 3) Electron affinity of phosphorous is greater than nitrogen
- 4)  $Cl_2O$  is strongly acidic in nature.

Ans: 3

Sol: EA of phosphorous is greater than that of Nitrogen

3. The atomic number of elements A, B, C and D are  $Z-1$ ,  $Z$ ,  $Z+1$  and  $Z+2$  respectively. If B is a noble gas choose the correct answer from the following elements (2008E)

- a) A has highest electron affinity
- b) C exist in +2 oxidation state
- c) D is an alkaline earth metal

- 1) a and b
- 2) b and c
- 3) a and c
- 4) a, b and c

Ans: 3

Sol. A = Halogen      B = Noble gas  
C = Alkalimetal    D = Alkaline earth metals

4. The elements X, Y and Z forms oxides which are acidic, basic and amphoteric respectively. The correct order of their electronegativity is (2008 M)

- 1)  $X > Y > Z$
- 2)  $Z > Y > X$
- 3)  $X > Z > Y$
- 4)  $Y > X > Z$

Ans: 3

Sol. X forms acidic oxide Ex.  $SiO_2$   
Y forms basic oxide Ex.  $MgO$   
Z forms Amphoteric oxide Ex.  $Al_2O_3$   
Order of electronegativity  $Si > Al > Mg$

↓

$X > Z > Y$

5. Elements with atomic number 38 belongs to (2007 M)

- 1) IIA group and 5<sup>th</sup> period
- 2) IIA group and 2<sup>nd</sup> period
- 3) VA group and 2<sup>nd</sup> period
- 4) IIIA group and 5<sup>th</sup> Period

Ans: 1

Sol.  $38 = 1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2$

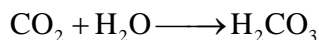
Last orbit contains two electron so group number is IIA and period is 5 (because of  $5s^2$ )

6. An oxide of an element is a gas and dissolve in water to give an acidic solution. The element belongs to (2007 E)

1) II group                      2) IV group                      3) VII group                      4) Zero group

Ans: 2

Sol. The gas is  $\text{CO}_2$



The element carbon belong to IVA group.

7. Identify the correct order in which the ionic radius of the following ions increases (2005M)

(I)  $\text{F}^-$                       (II)  $\text{Na}^+$                       (III)  $\text{N}^{3-}$   
 1. III, I, II                      2. I, II, III                      3. II, III, I                      4. II, I, III

Ans : 4

Sol.  $\text{Na}^+ (\text{II}) < \text{F}^- (\text{I}) < \text{N}^{3-} (\text{III})$

8. The first ionization potential of four consecutive elements, present in the second period of the periodic table are 8.3, 11.3, 14.5 and 13.6 eV respectively. Which one of the following is the first ionization potential (in eV) of nitrogen? (2004M)

1. 13.6                      2. 11.3                      3. 8.3                      4. 14.5

Ans : 4

Sol. Nitrogen has half filled electronic configuration

$\therefore$  It is stable and it has high IP value

It should be more than 13.6 eV.

9. The electron affinity values ( $\text{KJmol}^{-1}$ ) of three halogens X, Y and Z are respectively -349, -333 and -325. Then X, Y and Z respectively are (2003 M)

1.  $\text{F}_2$ ,  $\text{Cl}_2$  and  $\text{Br}_2$                       2.  $\text{Cl}_2$ ,  $\text{F}_2$  and  $\text{Br}_2$                       3.  $\text{Cl}_2$ ,  $\text{Br}_2$  and  $\text{F}_2$                       4.  $\text{Br}_2$ ,  $\text{Cl}_2$  and  $\text{F}_2$

Ans : 2

Sol. In VIIA group chlorine has highest electron affinity value then fluorine then bromine then iodine. So according to question the correct order is  $\text{Cl}_2 > \text{F}_2 > \text{Br}_2$

10. Which of the following pairs of ions have the same electronic configuration (2002 E)

1.  $\text{Cr}^{+3}$ ,  $\text{Fe}^{+3}$                       2.  $\text{Fe}^{+3}$ ,  $\text{Mn}^{+2}$                       3.  $\text{Fe}^{+3}$ ,  $\text{Co}^{+3}$                       4.  $\text{Sc}^{+3}$ ,  $\text{Cr}^{+3}$

Ans : 2

Sol.  $\text{Fe} = 1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^6$                        $\text{Fe}^{3+} = 1s^2 2s^2 2p^6 3s^2 3p^6 3d^5$

$\text{Mn} = 1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^5$                        $\text{Mn}^{2+} = 1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^5$

11. The electron configuration of elements A, B and C are  $[\text{He}] 2s^1$ ,  $[\text{Ne}] 3s^1$  and  $[\text{Ar}] 4s^1$  respectively. Which one of the following order is correct for the first ionization potentials (in  $\text{KJ.mol}^{-1}$ ) of A, B and C? (2001 E)

1)  $A > B > C$                       2)  $C > B > A$                       3)  $B > C > A$                       4)  $C > A > C$

Ans : 1

Sol.  $A \rightarrow [\text{He}] 2s^1$                        $B \rightarrow [\text{Ne}] 3s^1$                        $C \rightarrow [\text{Ar}] 4s^1$

First ionization potential in group top to bottom decreases.  $A > B > C$

12. Let electronegativity, ionisation energy and electron affinity be represented as EN, IP and EA respectively. Which one of the following equation is correct according to Mulliken? (2001E)

1)  $\text{EN} = \text{IP} \times \text{EA}$                       2)  $\text{EN} = \text{IP}/\text{EA}$                       3)  $\text{EN} = (\text{IP} + \text{EA}) / 2$                       4)  $\text{EN} = \text{IP} - \text{EA}$

Ans : 3

$$\frac{EA + IP}{2}$$

- Sol. According to Mulliken scale electro negativity =  $\frac{EA + IP}{2}$
13. The element with atomic number 12 belongs to .... Group and .... Period (2001E)  
 1) IA, third                      2) IIIA, third                      3) IIA, third                      4) IIA, second

Ans : 3

- Sol.  $12 = 1s^2 2s^2 2p^6 3s^2$   
 In valence shell '2' electron are present hence group number is IIA and period is third (due to  $3s^2$  configuration).

14. Which of the following is correct order of ionic radii (2000M)  
 1)  $Na^+ < Mg^{2+} < Al^{3+} < Si^{4+}$                       2)  $Al^{3+} < Si^{4+} < Na^+ > Mg^{2+}$   
 3)  $Si^{4+} < Al^{3+} > Mg^{2+} > Na^+$                       4)  $Na^+ > Mg^{2+} > Al^{3+} > Si^{4+}$

Ans : 4

- Sol.  $Na^+ > Mg^{2+} > Al^{3+} > Si^{4+} \rightarrow$  order of ionic radii. As the positive charge increases ionic radii decreases.

15. Which of the following has the highest electronegativity? (2000M)  
 1) Na                      2) Cl                      3) K                      4) B

Ans : 2

- Sol. Chlorine has more electronegativity
16.  $O_2^-$  and  $Si^{4+}$  are isoelectronic ions. If the ionic radius of  $O_2^-$  is  $1A_0$ , the ionic radius of  $Si^{4+}$  will be (1999E)  
 1)  $1.4A_0$                       2)  $0.41A_0$                       3)  $2.8A_0$                       4)  $1.5A_0$

Ans : 2

- Sol. Among  $O_2^-$  and  $Si^{4+}$  the ionic radius of  $Si^{4+}$  is less than  $O_2^-$  due o more positive charge and high nuclear charge in  $Si^{4+}$ .

17. The number of periods in the long form of periodic table is (1999M)  
 1) 6                      2) 7                      3) 8                      4) 18

Ans : 2

- Sol. In the long form of periodic table 7 periods and 18 groups are present.
18. Which of the following species has the highest ionization potential (1998E)  
 1)  $Li^+$                       2)  $Mg^+$                       3)  $Al^+$                       4) Ne

Ans : 1

- Sol.  $Li^+$  has more ionization potential.
19. As per the modern periodic law the physical and chemical function of their (1998E)  
 1) atomic number                      2) electronic configuration  
 3) atomic weight                      4) atomic size

Ans : 2

- Sol. According to modern periodic law physical and chemical properties of the elements are the periodic functions of electronic configuration.
20. The radii of F, F<sup>-</sup>, O and  $O_2^-$  are in the order (1998M)

1)  $O_2 > F^- > O > F$     2)  $O_2 > F^- > O > F$     3)  $F^- > O_2 > F > O$     4)  $O_2 > O > F^- > F$

Ans : 1

Sol. The order of radii is  $O^{2-} > F^- > O > F$

21. Which of the following elements has the highest first ionization potential? (1998M)

1) Boron                      2) Carbon                      3) Nitrogen                      4) Oxygen

Ans : 3

Sol. Nitrogen has highest first ionization potential due to half filled electronic configuration.

22. Of the following, the one with largest size is (1997)

1)  $Cl^-$                       2) Ar                      3)  $K^+$                       4)  $Ca^{2+}$

Ans : 1

Sol.  $Cl^-$  has largest size due to low nuclear charge.

23. The pair of elements that have similar chemical properties are (1996E)

1) Lithium and Magnesium                      2) Beryllium and Boron  
3) Aluminium and Magnesium                      4) Carbon and Nitrogen

Ans : 1

Sol. Li and Mg have similar chemical properties because they are diagonal related elements.

24. The general electronic configuration  $(n-1)d^3ns^2$  indicates that particular element belongs to (1996M)

1) VB                      2) IVB                      3) VIB                      4) IIIB

Ans : 1

Sol.  $(n-1)d^3ns^2$  electronic configuration belongs to VB group.

25. The order of decrease in atomic radii for Be, Na & Mg is (1995E)

1)  $Na > Mg > Be$     2)  $Mg > Na > Be$     3)  $Be > Na > Mg$     4)  $Be > Mg > Na$

Ans : 1

Sol. Order of atomic radii is  $Na > Mg > Be$ .

26. The name of the element with atomic number 100 was adopted in honour of (1995E)

1) Alfred Noble    2) Enric Fermi    3) Dimitri Mendeleef    4) Albert Einstein

Ans : 2

Sol. The name of element with atomic number 100 was adopted in honour of Enric Fermi.

27. Which of the following would you expect to have highest electronegativity? (1995E)

1) Mg(Z=12)    2) S(Z=16)    3) B(Z=5)    4) Te(Z=52)

Ans : 2

Sol. Among the four elements highest electronegativity element is S.

