

**AIEEE 2009**

**CHEMISTRY**

1. For a melting of a solid at 250C, the fusion process requires energy equivalent to 2906 J to be added to system considering the process to be reversible at fusion point, the entropy change for the process is

- a) 9.75 J K<sup>-1</sup>    b) 11.272 J K<sup>-1</sup>    c) 2.33 J K<sup>-1</sup>    d) Insufficient data

2. The reaction is spontaneous, if the cell potential is

- a) positive    b) negative    c) zero    d) infinity

3. 1 mole of an ideal gas 300 K is expanded isothermally from an initial volume of 1L to 10 L. The  $\Delta E$  for this process is ( $R=2 \text{ cal.K}^{-1}\text{mol}^{-1}$ )

- a) 163.7 cal    b) 1381.1 cal    c) 9 lit atmd) zero

4.  $S+32O_2 \rightarrow SO_3+2xkcal...(1)$

$SO_2 + 1/2 O_2 \rightarrow SO_3 + y \text{ kcal} \dots (2)$

Find out the heat of formation of SO<sub>2</sub>

- a) 2x-y    b) 2x+y    c) x+y    d) 2xy

5. Enthalpy of reaction  $\Delta H$  is represented as

- a)  $\Delta H = \sum H_P - \sum H_R$     b)  $\Delta H = \sum H_P dH_R$     c)  $\Delta H = dH_P dH_R$     d)  $\Delta H = dH_P + dH_R$

6. For a reaction to occur spontaneously

- a)  $(\Delta H - T\Delta S)$  must be negative    b)  $(\Delta H + T\Delta S)$  must be negative    c)  $\Delta H$  must be negative    d)  $\Delta S$  must be negative

7. In general, for exothermic reactions to be spontaneous

- a) temperature should be high    b) temperature should be zero    c) temperature should be low    d) temperature has no effect

8. If the enthalpy of vapourisation of water is 186.5 J mol<sup>-1</sup>, the entropy of its vapourisation will be

- a) 0.5 JK<sup>-1</sup>mol<sup>-1</sup>    b) 1.0 JK<sup>-1</sup>mol<sup>-1</sup>    c) 1.5 JK<sup>-1</sup>mol<sup>-1</sup>    d) 2.0 JK<sup>-1</sup>mol<sup>-1</sup>

9. All the naturally occurring processes proceed spontaneously in a direction which leads to

- a) Decrease of entropy    b) Increase of Enthalpy    c) Increase of free energy    d) Decrease of free energy

10. The heat of formation of CO and CO<sub>2</sub> are -26.4 kcal and -94 kcal respectively. Heat of combustion of CO will be

- a) 26.4 kcal +52.8      b) -67.6 kcal      c) -120.6 kcal      d)

11. In which of the following neutralisation reaction, the heat of neutralisation will be highest.

- a)  $\text{NH}_4\text{OH}$  and  $\text{H}_2\text{SO}_4$       b)  $\text{HCl}$  and  $\text{NaOH}$       c)  $\text{CH}_3\text{COOH}$  and  $\text{KOH}$       d)  $\text{CH}_3\text{COOH}$  and  $\text{NH}_4\text{OH}$

12. Heat of neutralisation of strong acid against strong base is constant and is equal to

- a) -13.7 kcal all of the above      b) -57 kJ      c)  $-5.7 \times 10^4 \text{ J}$       d)

13. The number of atoms in 100g of an FCC crystal with density  $d = 10 \text{ g/cm}^3$  and cell edge as 200 pm is equal to

- a) 31025      b) 51024      c) 11025      d) 21025

14. For the reaction  $\text{H}_2\text{Cl}_2 \xrightarrow{\text{sunlight}} 2\text{HCl}$  taking place on water, the order of reaction is

- a) 0      b) 1      c) 2      d) 3

15. In which of the following species is the underlined carbon having  $\text{sp}^3$  hybridisation

- a)  $\text{CH}_3 \underline{\text{C}}\text{OOH}$       b)  $\text{CH}_3\text{CH}_2\text{OH}$       c)  $\text{CH}_3\text{COCH}_3$       d)  $\text{CH}_2\text{CHCH}_3$

16. The high density of water compound to ice is due to

- a) dipole dipole interaction      b) hydrogen bonding interaction      c) dipole induced dipole interaction      d) none of the above

17. The molecular species having highest bond order is

- a)  $\text{O}_2$       b)  $\text{O}_2$       c)  $\text{O}_2$       d)  $\text{O}_2$

18.  $\text{NH}_3$  and  $\text{BF}_3$  form adduct readily because they form

- a) Ionic bond      b) Covalent bond      c) Co-ordinate bond      d) Hydrogen bond

19. Which of the following is electron deficient?

- a)  $\text{BCl}_3$       b)  $\text{PCl}_3$       c)  $\text{PCl}_5$       d)  $\text{NH}_3$

20. Which of the following compounds has 0?

- a)  $\text{CCl}_4$       b)  $\text{CHCl}_3$       c)  $\text{HF}$       d)  $\text{NH}_3$

21. The lustre of the metal is on account of

- a) high density of metals      b) high polish of metals      c) reflection of light due to the presence of free electrons      d) chemical inertness of metals

22. The hybrid states of carbon in diamond, graphite, and acetylene are respectively.

- a)  $\text{sp}^2\text{sp}^3$       b)  $\text{sp}^2\text{sp}^3$       c)  $\text{sp}^3\text{sp}^2\text{sp}$       d)  $\text{sp}^2\text{sp}^3\text{sp}$

23. In a homonuclear molecule which of the following set of orbitals are degenerate?

- a)  $2s1s$     b)  $2p_x2p_y$     c)  $2p_x2p_z$     d)  $2p_z, 2p_x$

24. The correct order of decreasing polarisability of ions is

- a)  $ClBrIF$     b)  $FIBrCl$     c)  $FCIBrI$     d)  $IBrClF$

25. The maximum extent of H bonding is shown by

- a)  $H_2O$     b)  $H_2Se$     c)  $H_2S$     d)  $HF$

26. Which of the following does not apply to bonding in metals

- a) Non directional bonds    b) Mobility of valence electrons    c) Delocalisation of electrons    d) Highly directed bonds

27. The pyramidal geometry is associated with

- a)  $CH_4$     b)  $NH_3$     c)  $H_2O$     d)  $CO_2$

28. The H-O-H angle in water molecules is

- a) 900    b) 1800    c) 1050    d) 750

29. A  $sp^3$  hybrid orbital contains

- a) 14s character    b) 12s character    c) 32s character    d) 23s character

30. Which of the following bonds has most polar character?

- a) C-O    b) C-Br    c) C-F    d) C-S

31. Covalent compounds are soluble in

- a) Polar solvents    b) Non-polar solvents    c) Concentrated acids    d) All solvents

32. Element X is strongly electropositive and element Y is strongly electronegative. Both are univalent. The compound formed would be

- a)  $XY$     b)  $XY$     c)  $X-Y$     d)  $XY$

33. Among the 2nd group elements, the metal forming predominantly covalent compound is

- a) Be    b) Mg    c) Sr    d) Ca

34. Methanol and Ethanol are miscible in water due to

- a) Co-valent character    b) Hydrogen bonding character    c) Oxygen bonding character    d) None of the above

35. Which of the following molecules does not have a dipole moment?

- a)  $ClO_2$     b)  $CO_2$     c)  $NO_2$     d)  $SO_2$

36. Which is true about the electronegativity order of the following?

a) P>S    b) C >N    c) Br >Cl    d) Sr >Ca

37. Eka-aluminium and Eka-silicon are known as

a) Gallium & Germanium    b) Al & Si    c) Fe & S    d) Proton & Silicon

38. In the modern periodic table, elements are arranged in the increasing order of

a) Atomic mass    b) Atomic number    c) Mass number    d) Isotopic number

39. Which of the following has the maximum electron affinity?

a) F    b) S    c) I    d) Cl

40. The correct sequence of elements in the decreasing order of first IE is

a) Na>Mg>Al>Si    b) Mg>Na>Al>Si    c) Al>Mg>Na>Si    d) Si>Mg>Al>Na

41. The ionic radius of  $\text{N}^{3-}$ ,  $\text{O}^{2-}$ ,  $\text{F}^{-}$ ,  $\text{Na}^{+}$  follows the order

a)  $\text{N}^{3-} > \text{O}^{2-} > \text{F}^{-} > \text{Na}^{+}$     b)  $\text{N}^{3-} > \text{Na}^{+} > \text{O}^{2-} > \text{F}^{-}$     c)  $\text{Na}^{+} > \text{O}^{2-} > \text{N}^{3-} > \text{F}^{-}$     d)  $\text{Na}^{+} > \text{F}^{-} > \text{O}^{2-} > \text{N}^{3-}$

42. Alkali metal in each period have

a) smallest size    b) lowest IE    c) highest IE    d) highest electro negativity

43. Which of the following is not isoelectronic with  $\text{O}^{2-}$

a)  $\text{N}^{3-}$     b) Na    c) F    d) Ti

44. The element with  $Z=26$  will be found in group

a) 2    b) 8    c) 6    d) 10

45. The valency of noble gases, in general is

a) 0    b) 1    c) 3    d) 2

46. The oxide of which of the following will be acidic

a) Mg    b) Rb    c) Li    d) Cl

47. Which of the following decreases in going down the halogen group?

a) Ionic Radius    b) Atomic radius    c) IE    d) Boiling point

48. Which of the following requires radiation of highest frequency to cause emission of electron?

a) Na    b) Mg    c) K    d) Ca

49. Which of the following is associated with biggest jump between 2nd and 3rd IE?

- a)  $1s^2 2s^2 2p^2$       b)  $1s^2 2s^2 2p^6 3s^1$       c)  $1s^2 2s^2 2p^6 3s^2$       d)  
 $1s^2 2s^2 2p^1$

50. Among the following which one will have highest electron affinity?

- a)  $1s^1$       b)  $1s^2 2s^1$       c)  $1s^2 2s^2 2p^4$       d)  
 $1s^2 2s^2 2p^5$