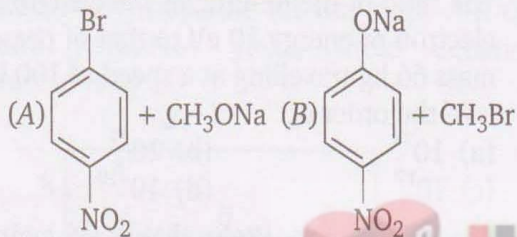
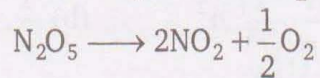


1. When the electron of a hydrogen atom jumps from $n = 4$ to $n = 1$ state, the number of spectral lines emitted is
 (a) 15 (b) 9
 (c) 6 (d) 3
2. Which of the following is an appropriate set of reactants for the preparation of 1-methoxy-4-nitrobenzene?



- (a) A (b) B
 (c) Both A and B (d) None of these
3. Consider the decomposition of N_2O_5 as



The rate of reaction is given by

$$-\frac{d[\text{N}_2\text{O}_5]}{dt} = \frac{1}{2} \frac{d[\text{NO}_2]}{dt} = 2 \frac{d[\text{O}_2]}{dt} = k_1[\text{N}_2\text{O}_5]$$

Therefore, $-\frac{d[\text{N}_2\text{O}_5]}{dt} = k_1[\text{N}_2\text{O}_5]$

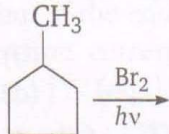
$$\frac{+d[\text{NO}_2]}{dt} = 2k_1[\text{N}_2\text{O}_5] = k'_1[\text{N}_2\text{O}_5]$$

$$\frac{+d[\text{O}_2]}{dt} = \frac{1}{2} k_1[\text{N}_2\text{O}_5] = k''_1[\text{N}_2\text{O}_5]$$

Choose the correct option.

- (a) $k_1 = k'_1 = k''_1$
 (b) $k_1 = 2k'_1 = k''_1$
 (c) $4k_1 = k'_1 = 2k''_1$
 (d) $4k_1 = 2k'_1 = k''_1$
4. The logarithm of the equilibrium constant of the cell reaction corresponding to the cell $\text{X}(s) | \text{X}^{2+}(aq) || \text{Y}^+(aq) | \text{Y}(s)$ with standard cell potential, $E^\circ_{\text{cell}} = 1.2 \text{ V}$ is given by
 (a) 12.5 (b) 21.5
 (c) 40.5 (d) 47.2

5. If the half cell reactions are given as
 (i) $\text{Fe}^{2+}(\text{aq}) + 2\text{e}^- \rightarrow \text{Fe}(\text{s}); E^\circ = -0.44 \text{ V}$
 (ii) $2\text{H}^+(\text{aq}) + \frac{1}{2}\text{O}_2(\text{g}) + 2\text{e}^- \rightarrow \text{H}_2\text{O}(\text{l})$
 $E^\circ = +1.23 \text{ V}$
- The E° for the reaction
 $\text{Fe}(\text{s}) + 2\text{H}^+ + \frac{1}{2}\text{O}_2(\text{g}) \rightarrow \text{Fe}^{2+}(\text{aq}) + \text{H}_2\text{O}(\text{l})$
 is
 (a) +1.67 V (b) -1.67 V
 (c) +0.79 V (d) -0.79 V
6. The most adsorbed gas on activated charcoal is
 (a) N_2 (b) H_2
 (c) CO_2 (d) CH_4
7. Which of the following represents the arrangement in increasing order of bond order and bond dissociation energy?
 (a) $\text{O}_2^+ < \text{O}_2^{2-} < \text{O}_2^- < \text{O}_2$
 (b) $\text{O}_2^{2-} < \text{O}_2^- < \text{O}_2 < \text{O}_2^+$
 (c) $\text{O}_2 < \text{O}_2^+ < \text{O}_2^{2-} < \text{O}_2^-$
 (d) $\text{O}_2^{2-} < \text{O}_2^- < \text{O}_2^+ < \text{O}_2$
8. AgCl is dissolved in excess of each of NH_3 , KCN and $\text{Na}_2\text{S}_2\text{O}_3$. The complex ions produced in each case are
 (a) $[\text{Ag}(\text{NH}_3)_2]^+$, $[\text{Ag}(\text{CN})_2]^+$ and $[\text{Ag}(\text{S}_2\text{O}_3)_2]^{3-}$
 (b) $[\text{Ag}(\text{NH}_3)_2]^{2+}$, $[\text{Ag}(\text{CN})_2]^{3-}$ and $[\text{Ag}(\text{S}_2\text{O}_3)_2]^{2-}$
 (c) $[\text{Ag}(\text{NH}_3)_4]^{2+}$, $[\text{Ag}(\text{CN})_2]^{3-}$ and $[\text{Ag}_2(\text{S}_2\text{O}_3)_2]^{2-}$
 (d) $[\text{Ag}(\text{NH}_3)_2]^+$, $[\text{Ag}(\text{CN})_2]^-$ and $[\text{Ag}(\text{S}_2\text{O}_3)_2]^{3-}$
9. The most stable complex among the following is
 (a) $[\text{Pd}(\text{CN})_4]^{4-}$ (b) $[\text{Fe}(\text{CO})_5]$
 (c) $[\text{Ni}(\text{CN})_4]^{4-}$ (d) $[\text{Ni}(\text{CN})_4]^{3-}$
10. The maximum number of P—H bonds are contained in which of the following molecules?
 (a) H_3PO_2 (b) H_3PO_3
 (c) H_3PO_4 (d) $\text{H}_4\text{P}_2\text{O}_7$
11. The bond order of the N—O bonds in NO_3^- ion is
 (a) 0.33 (b) 1.00 (c) 1.33 (d) 1.50
12. Among the following the third ionisation energy is highest for
 (a) magnesium (b) boron
 (c) beryllium (d) aluminium
13. The highest lattice energy corresponds to
 (a) MgO (b) CaO
 (c) SrO (d) BaO
14. The change of energy on freezing 1.00 kg of liquid water at 0°C and 1 atm is
 (a) 236.7 kJ kg^{-1} (b) 333.4 kJ kg^{-1}
 (c) $-333.4 \text{ kJ kg}^{-1}$ (d) $-236.7 \text{ kJ kg}^{-1}$
15. The degree of hardness of water is usually expressed in terms of
 (a) ppm by weight of MgSO_4
 (b) g/L of CaCO_3 and MgCO_3 present
 (c) ppm by weight of CaCO_3 irrespective of whether it is actually present
 (d) ppm of CaCO_3 actually present in water
16. 0.1 M NaCl and 0.05 M BaCl_2 solutions are separated by a semipermeable membrane in a container. For this system, choose the correct answer.
 (a) There is no movement of any solution across the membrane
 (b) Water flows from BaCl_2 solution towards NaCl solution
 (c) Water flows from NaCl solution towards BaCl_2 solution
 (d) Osmotic pressure of 0.1 M NaCl is lower than the osmotic pressure of BaCl_2 (Assume complete dissociation)
17. If W is the amount of work done by the system and q is the amount of heat supplied to the system, identify the type of the system.
 (a) Isolated system
 (b) Closed system
 (c) Open system
 (d) System with thermally conducting walls
18. The charge balance equation of species in 0.100 M acetic acid solution is given by
 (a) $[\text{H}^+] = [\text{OH}^-]$
 (b) $[\text{H}^+] = [\text{CH}_3\text{COO}^-]$
 (c) $[\text{H}^+] = [\text{OH}^-] + [\text{CH}_3\text{COO}^-]$
 (d) $2[\text{H}^+] = [\text{OH}^-] + [\text{CH}_3\text{COO}^-]$

19. Total number of voids in 0.5 mole of a compound forming hexagonal closed packed structure are
 (a) 6.022×10^{23} (b) 3.011×10^{23}
 (c) 9.033×10^{23} (d) 4.516×10^{23}
20. Four solutions of K_2SO_4 with the following concentration 0.1 M, 0.01 m, 0.001 m and 0.0001 m are available. The maximum value of van't Hoff factor, i , corresponds to
 (a) 0.0001 m solution (b) 0.001 m solution
 (c) 0.01 m solution (d) 0.1 m solution
21. The pH of a solution prepared by mixing 2.0 mL of HCl solution of pH 3.0 and 3.0 mL of NaOH of pH 10.0 is
 (a) 2.5 (b) 3.5
 (c) 5.5 (d) 6.5
22. The set of quantum numbers that represents the highest energy of an atom is
 (a) $n = 4, l = 0, m = 0, s = +\frac{1}{2}$
 (b) $n = 3, l = 2, m = 1, s = +\frac{1}{2}$
 (c) $n = 3, l = 1, m = 1, s = +\frac{1}{2}$
 (d) $n = 3, l = 0, m = 0, s = +\frac{1}{2}$
23. Which of the following sets of quantum numbers represents the 19th electron in chromium? ($Z = 24$ for Cr)
 (a) $4, 0, 0, \frac{1}{2}$ (b) $4, 1, -1, \frac{1}{2}$
 (c) $3, 2, 2, \frac{1}{2}$ (d) $3, 2, -2, \frac{1}{2}$
24. The number of molecules in 100 mL of 0.02 N H_2SO_4 is
 (a) 6.02×10^{22} (b) 6.02×10^{21}
 (c) 6.02×10^{20} (d) 6.02×10^{18}
25. For the reaction
 $AB(g) \rightleftharpoons A(g) + B(g)$, AB is 33% dissociated at a total pressure of p . Therefore, p is related to K_p by one of the following options
 (a) $p = K_p$ (b) $p = 3K_p$
 (c) $p = 4K_p$ (d) $p = 8K_p$
26. When subjected to acid catalysed hydration, the order of reactivity of the alkenes; $(CH_3)_2C=CH_2$ (I), $CH_3CH=CH_2$ (II) and $CH_2=CH_2$ (III) is
 (a) III > II > I (b) I > III > II
 (c) I > II > III (d) II > I > III
27. Name the reagent used to bring about the following transformation : But-2-ene to ethanal
 (a) $K_2Cr_2O_7$ in acidic medium
 (b) CrO_2Cl_2/H_3O^+
 (c) PCC
 (d) O_3/H_2O -Zn dust
28. Arrange the following in increasing order of their basic strength :
 CH_3NH_2 (I), $(CH_3)_2NH$ (II), $(CH_3)_3N$ (III), $C_6H_5CH_2NH_2$ (IV)
 (a) IV < III < II < I (b) IV < III < I < II
 (c) I < II < III < IV (d) IV < III < I = II
29. Arrange the following in increasing order of their intermolecular forces : Nylon-66 (I), Buna-S (II), Polythene (III)
 (a) II, I, III (b) III, II, I
 (c) I, II, III (d) II, III, I
30. The pK_{a1} and pK_{a2} of an amino acid are 2.3 and 9.7 respectively. The isoelectric point of the amino acid is
 (a) 12.0 (b) 7.4
 (c) 6.0 (d) 3.7
31. The transfer RNA anticodon for the messenger RNA codon G—C—A is
 (a) C—G—U (b) G—C—U
 (c) U—G—C (d) G—U—C
32. The number of β -particles emitted during the transformation of x_yA to m_nB
 (a) $\frac{x-m}{4}$ (b) $n + \frac{x-m}{2} + y$
 (c) $n + \frac{x-m}{2} - y$ (d) $2y - n + x - m$
33. In the following reaction,

 the major product obtained is

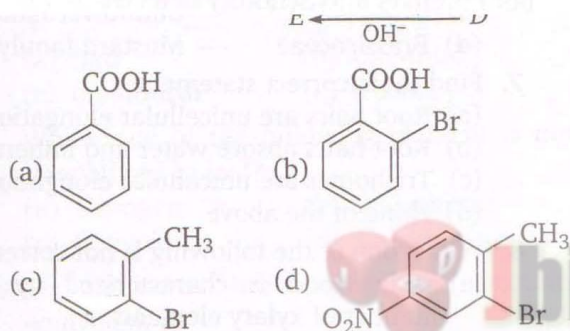
46. Thermodynamically the most stable form of carbon is

- (a) diamond (b) graphite
(c) fullerenes (d) coal

47. The estimation of available chlorine in bleaching powder is done by

- (a) acid-base titration
(b) permanganometric titration
(c) iodimetric titration
(d) iodometric titration

48. A solid is formed by two elements P and Q . The element Q forms cubic close packing and atoms of P occupy one-third of tetrahedral voids. The formula of the compound is



35. Which of the following fluoride of xenon has zero dipole moment?

- (a) XeF_2 (b) XeF_3
(c) XeF_4 (d) XeF_6

36. Choose the correct statement.

- (a) $[\text{Co}(\text{NH}_3)_6]^{2+}$ is oxidised to diamagnetic $[\text{Co}(\text{NH}_3)_6]^{3+}$ by the oxygen in air
(b) Tetrahedral complexes are more stable than octahedral complexes
(c) $[\text{Fe}(\text{CN})_6]^{3-}$ is stable but $[\text{FeF}_6]^{3-}$ is unstable
(d) The $[\text{Cu}(\text{NH}_3)_4]^{2+}$ ion has a tetrahedral geometry and is diamagnetic

37. The hydrolysis of NCl_3 by water produces

- (a) NH_2OH and HOCl
(b) NH_2NH_2 and HCl
(c) NH_4OH and HOCl
(d) NH_2Cl and HOCl

- (a) PQ_3 (b) P_3Q
(c) P_2Q_3 (d) P_3Q_2

49. The compound exhibiting maximum value of equivalent conductance in a fused state is

- (a) SrCl_2 (b) CaCl_2
(c) MgCl_2 (d) BeCl_2

50. Which of the following have been arranged in decreasing order of oxidation number of sulphur?

- (a) $\text{Na}_2\text{S}_4\text{O}_6 > \text{H}_2\text{S}_2\text{O}_7 > \text{Na}_2\text{S}_2\text{O}_3 > \text{S}_8$
(b) $\text{H}_2\text{SO}_4 > \text{SO}_2 > \text{H}_2\text{S} > \text{H}_2\text{S}_2\text{O}_8$
(c) $\text{SO}_2^{2+} > \text{SO}_4^{2-} > \text{SO}_3^{2-} > \text{HSO}_4^-$
(d) $\text{H}_2\text{SO}_5 > \text{H}_2\text{SO}_3 > \text{SCl}_2 > \text{H}_2\text{S}$

41. The pH of a solution obtained by mixing equal volumes of $\frac{N}{10}$ NaOH and $\frac{N}{20}$ HCl is

- (a) 13.4 (b) 12.4
(c) 7.6 (d) 1.6

42. The solubilities of Na_2SO_4 , BeSO_4 , MgSO_4 and BaSO_4 will follow the order

- (a) $\text{BeSO}_4 > \text{MgSO}_4 > \text{Na}_2\text{SO}_4 > \text{BaSO}_4$
(b) $\text{BeSO}_4 > \text{Na}_2\text{SO}_4 > \text{MgSO}_4 > \text{BaSO}_4$
(c) $\text{MgSO}_4 > \text{BeSO}_4 > \text{Na}_2\text{SO}_4 > \text{BaSO}_4$
(d) $\text{Na}_2\text{SO}_4 > \text{BeSO}_4 > \text{MgSO}_4 > \text{BaSO}_4$

43. Arrange the following compounds in increasing order of their reactivity in nucleophilic addition reactions.

Ethanal (I), Propanal (II), Propanone (III), Butanone (IV)

- (a) $\text{III} < \text{II} < \text{I} < \text{IV}$ (b) $\text{II} < \text{I} < \text{III} < \text{IV}$
(c) $\text{IV} < \text{III} < \text{II} < \text{I}$ (d) $\text{I} < \text{II} < \text{III} < \text{IV}$

44. The strongest Lewis acid among boron halides is

- (a) BBr_3 (b) BCl_3
(c) BI_3 (d) BF_3

45. The correct order of increasing hydration energy of the following conjugate bases of oxoacids of chlorine is

- (a) $\text{ClO}^- < \text{ClO}_2^- < \text{ClO}_3^- < \text{ClO}_4^-$
(b) $\text{ClO}_4^- < \text{ClO}_3^- < \text{ClO}_2^- < \text{ClO}^-$
(c) $\text{ClO}_4^- < \text{ClO}_3^- < \text{ClO}^- < \text{ClO}_2^-$
(d) $\text{ClO}_3^- < \text{ClO}_4^- < \text{ClO}_2^- < \text{ClO}^-$



1. c	2. c	3. a	4. c	5. a	6. c	7. b	8. d	9. b	10. a
11. c	12. c	13. a	14. c	15. c	16. b	17. b	18. d	19. c	20. a
21. b	22. b	23. a	24. c	25. d	26. c	27. d	28. b	29. d	30. c
31. a	32. c	33. c	34. b	35. c	36. a	37. c	38. b	39. d	40. c
41. b	42. d	43. c	44. c	45. a	46. b	47. d	48. c	49. a	50. d