31. Which of the following statement does not hold true for the following reaction:

$$xCu_3P + yCr_2O_7^{2-} + zH^+ \longrightarrow Cu^{2+} + H_3PO_4 + Cr^{3+}$$

(A) Cu in Cu_3P is oxidized to Cu^{2+} whereas P in Cu_3P is also oxidized to PO_4^{3-}.
(B) Cu in Cu_3P is oxidized to Cu^{2+} whereas P in Cu_3P is reduced to H_3PO_4.
(C) In the conversion of Cu_3P to Cu^{2+} and H_3PO_4, 11 electrons are involved.
(D) The value of x is 6.

32. Which of the following will have the least bond angle?
(A) CH_4 (B) NH_3 (C) PH_3 (D) H_2O

33. The color of $KMnO_4$ is due to:
(A) d-d transition
(B) L $\rightarrow$ M charge transfer transition
(C) σ-σ^* transition
(D) M $\rightarrow$ L charge transfer transition

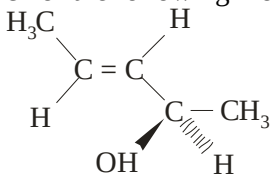
34. For which of the following elements it is difficult to disproportionate in +5 oxidation state?
(A) N (B) As (C) Sb (D) Bi

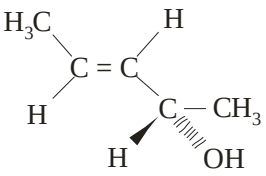
35. A solution when diluted with H_2O and boiled, it gives a white precipitate. On addition of excess NH_4Cl/NH_4OH, the volume of precipitate decreases leaving behind a white gelatinous precipitate. Identify the precipitate which dissolves in NH_4OH/NH_4Cl.
(A) $Zn(OH)_2$ (B) $Sr(OH)_2$ (C) $Mg(OH)_2$ (D) $Ca(OH)_2$

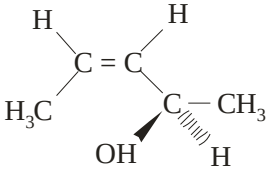
36. The electrophile involved in Reimer-Tiemann reaction is:
(A) :CHCl (B) $^{\oplus}CHCl_2$ (C) :CCl_2 (D) $^{\bullet}CCl_3$

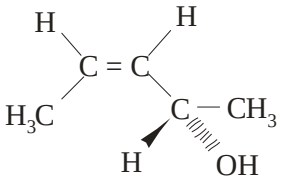
37. Williamson's synthesis involves:
(A) S_N1 mechanism (B) Nucleophilic addition (C) S_N2 mechanism (D) S_Ni mechanism

38. Which of the following molecules have (2R, 3-Z) configuration?

(A) 

(B) 

(C) 

(D) 

39. Which of the following solutions will have pH close to 1.0?
(A) 100 ml of (M|10) HCl and 100 ml of (M|10) NaOH
(B) 55 ml of (M|10) HCl and 45 ml of (M|10) NaOH
(C) 10 ml of (M|10) HCl and 90 ml of (M|10) NaOH
(D) 75 ml of (M|5) HCl and 25 ml of (M|5) NaOH

40. Planar structure is shown by:
(A) CO_3^{2-} (B) BCl_3 (C) $N(SiH_3)_3$ (D) All of these

41. From which of the following species, it is easiest to remove one electron?
(A) O(g) (B) O^{2-} (g) (C) O^+ (g) (D) O^- (g)

42. How many moles of HIO_4 are consumed by Sucrose?
(A) 1 (B) 2 (C) 3 (D) 4

43. Graph between log $\frac{x}{m}$ and log P is a straight line inclined at an angle $\theta = 45°$. When pressure is 0.5 atm and log k = 0.699, the amount of solute adsorbed per g of adsorbent will be:
(A) 0.397 g/g adsorbent (B) 1.5 g/g adsorbent (C) 2.5 g/g adsorbent (D) 0.25 g/g adsorbent

44. Which of the following pair is incorrectly matched?
(A) Van Arkel method – Zirconium
(B) Kroll's Process – Titanium
(C) Distillation – Zinc
(D) Froth Floatation – Cerussite

45. What is the hybridization of ICN(s)?
(A) sp^3, sp^3d (B) sp^3d, sp^3d (C) sp^3, sp^3 (D) sp^3d, sp^3d^2

46. $N_2 + 3H_2 \rightleftharpoons 2NH_3$

Which is correct statement if N_2 is added at equilibrium condition?
(A) The equilibrium will shift to forward direction because according to II law of thermodynamics, the entropy must increases in the direction of spontaneous reaction.
(B) The condition for equilibrium is $G_{N_2} + 3G_{H_2} = 2G_{NH_3}$ where G is Gibbs free energy per mole of the gaseous species measured at that partial pressure. The condition of equilibrium is unaffected by the use of catalyst, which increases the rate of both the forward and backward reactions to the same extent.
(C) The catalyst will increase the rate of forward reaction by α and that of backward by β.
(D) Catalyst will not alter the rate of either of the reaction.

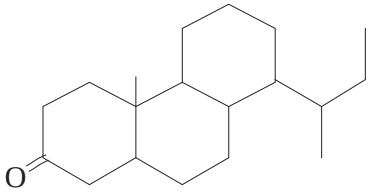
47. Two liquids X and Y forms an ideal solution at 300 K, vapour pressure of the solution containing 1 mole of X and 3 moles of Y is 550 mm Hg. At the same temperature, 1 mole of Y is further added to this solution vapour pressure of the solution increases by 10 mm Hg. Vapour pressure (in mm Hg) of X and Y in their pure states will be, respectively.
(A) 200 and 300 (B) 300 and 400 (C) 400 and 600 (D) 500 and 600

48. Order of a reaction can be
(A) Fractional (B) Zero (C) Integer (D) All of these

49. A current of 2.0 A passed for 5 hours through a molten metal salt deposits 22.2 g of metal (At. wt. = 177). The oxidation state of the metal in the metal salt is:
(A) +1 (B) +2 (C) +3 (D) +4

50. If the coordination number of Ca^{2+} in CaF_2 is 8, then the coordination number of F^- ion would be:
(A) 3 (B) 4 (C) 6 (D) 8

51. Count the number of stereocentres in the molecule given below:



(A) Three (B) Five (C) Six (D) Seven

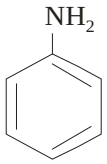
52. Densities of two gases having same molar mass are in the ratio 1 : 2 and their temperatures are in the ratio 2 : 1, then the ratio of their respective pressures is:
(A) 1 : 1 (B) 1 : 2 (C) 2 : 1 (D) 4 : 1

53. $H_3PO_4 + H_2O \rightleftharpoons H_3O^+ + H_2PO_4^-; pK_1 = 2.15$

$H_2PO_4^- + H_2O \rightleftharpoons H_3O^+ + HPO_4^{2-}; pK_2 = 7.20$

Hence pH of 0.01 M NaH_2PO_4 is:
(A) 9.35 (B) 4.675 (C) 2.675 (D) 7.350

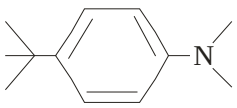
54. Which of the following is most planar?
(A) $P_3N_3Cl_6$ (B) $P_3N_3(Ph)_6$ (C) $P_3N_3F_6$ (D) $P_3N_3(CH_3)_6$

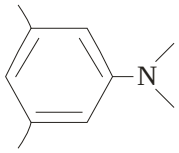
55. 

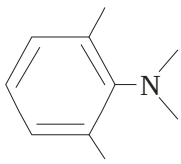
$+ CHCl_3 + KOH \longrightarrow$?

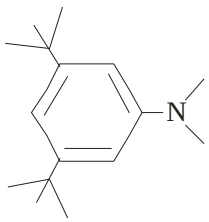
(A) Phenyl isocyanide (B) Benzyl amine (C) Benzyl chloride (D) None of these

56. Maximum extent of steric inhibition of resonance can be expected in:

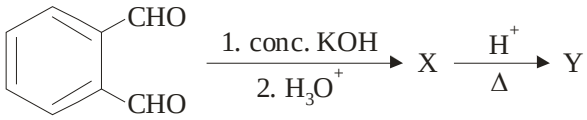
(A) 

(B) 

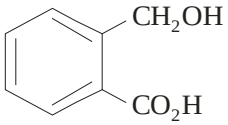
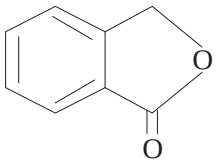
(C) 

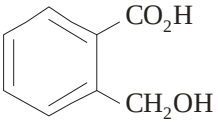
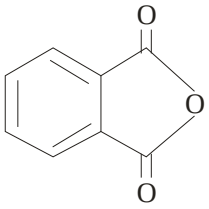
(D) 

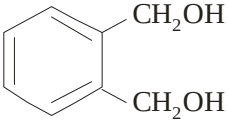
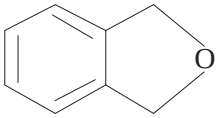
57. In the reaction sequence:

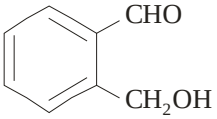
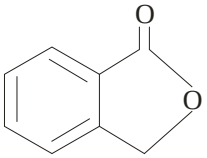


The major products X and Y respectively are:

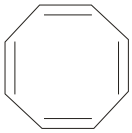
(A)  and 

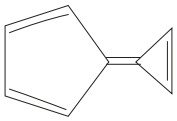
(B)  and 

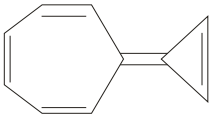
(C)  and 

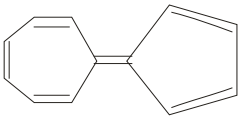
(D)  and 

58. Which of the following is correct?

(A)  is anti-aromatic

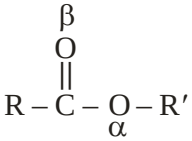
(B)  is aromatic

(C)  is aromatic

(D)  is non-aromatic

59. The hydridisation of central atom in dimer of BH_3 and BeH_2 is:
(A) sp^2, sp^2 (B) sp^3, sp^2 (C) sp^3, sp^3 (D) sp^2, sp^3

60. Which is more basic oxygen in an ester



(A) O denoted by α
(B) O denoted by β
(C) Both equally
(D) None of the oxygen atoms is basic