HINTS AND SOLUTIONS

PART-B : CHEMISTRY

31. (B)
Oxidation state of P is getting changed from –3 to +5 during this conversion. That is, P in Cu_3P is getting oxidized to H_3PO_4.

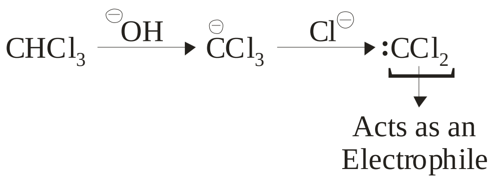
32. (C)
PH_3 is a Drago's compound in which bond angle is approximately 90°.

33. (B)
Here Mn is in highest oxidation state (+7), so no d-electrons are there. So the color arises from ligand to metal charge transfer transition.

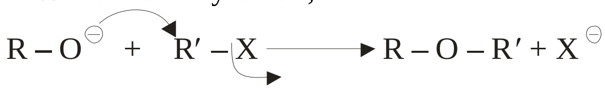
34. (D)
Because Bi do not show +5 oxidation state, because of Inert Pair Effect.

35. (A)
Due to the formation of tetraamminezinc(II) complex:
$$Zn^{2+} + NH_4OH \longrightarrow [Zn(NH_3)_4]^{2+}$$

36. (C)



37. (C)
In Williamson's synthesis,



Thus, it involves S_N2 mechanism.

38. (C)

39. (D)
Miliequivalents of $H^+ = 75 \times \frac{1}{5} = 15$

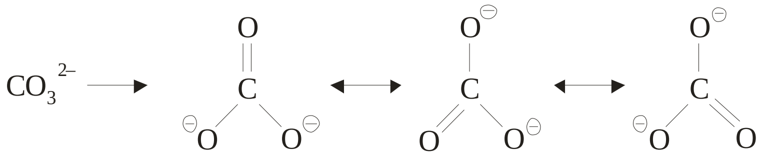
Miliequivalents of $^-OH = 25 \times \frac{1}{5} = 5$

Net Miliequivalents of H^+ = 10

Concentration of $H^+ = \frac{10}{100} = 0.1 = 10^{-1}$

pH = –log [H^+]
= –log (0.1)
= 1

40. (D)

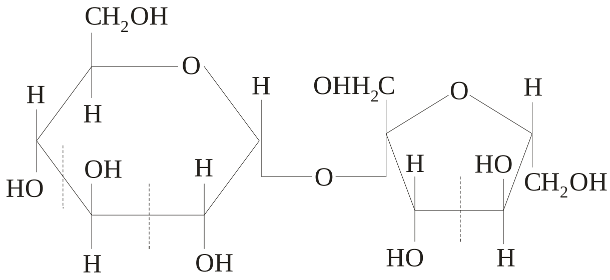


Due to backbonding in $N(SiH_3)_3$, it has planar structure.
In BCl_3; B and in CO_3^{2-} C has sp^2 hybridisation.

41. (B)

Due to inter electronic repulsions

42. (C)



43. (C)

$$\log\frac{x}{m}=\log k+\frac{1}{n}\log P$$

$$\log\frac{x}{m}=0.699+(\tan 45°)\ (\log\ (0.5))$$

$$\log\frac{x}{m}=0.3979=0.40$$

$$\frac{x}{m}=2.5$$

x = 2.5 g/g adsorbent

44. (D)
Cerussite ($PbCO_3$) undergoes calcination.

45. (A)

$$ICN(s)\longrightarrow \underset{(sp^3)}{I_2CN^+}+\underset{(sp^3d)}{I(CN)_2^-}$$

46. (B)

47. (C)

$$550=\left(\frac{1}{4}\right)\left(P_X{}^0\right)+\left(\frac{3}{4}\right)\left(P_Y{}^0\right)$$

$$2200=P_X{}^0+3P_Y{}^0 \qquad \text{.......... (A)}$$

$$560=\left(\frac{1}{5}\right)\left(P_X{}^0\right)+\left(\frac{4}{5}\right)\left(P_Y{}^0\right)$$

$$2800=P_X{}^0+4P_Y{}^0 \qquad \text{........... (B)}$$

On solving A and B, we get,
$P_X{}^0=400$ and $P_Y{}^0=600$

48. (D)

49. (C)

$$\frac{Q}{F}=\text{moles}\bullet n_f$$

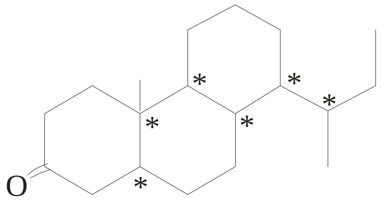
$$\frac{i\times t}{F}=\text{moles}\bullet n_f$$

$$\frac{2\times5\times3600}{96500}=\frac{22.2}{177}\bullet n_f$$

$\Rightarrow n_f = 3$
Thus, oxidation state of metal in the metal salt is +3.

50. (B)
CaF_2 has fluorite type structure in which coordination number of Ca^{2+} is 8 and of F^- it is 4.

51. (C)



($* \rightarrow$ Stereocentres)

52. (A)
Effect of densities and temperature will nullify each other and pressure will be same for both.

$$d = \frac{PM}{RT}$$

$$\text{So } P = \frac{dRT}{M}$$

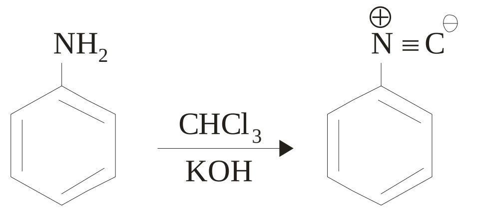
53. (B)

$$pH = \frac{pK_1 + pK_2}{2}$$

$$= \frac{2.15 + 7.2}{2} = 4.675$$

54. (C)
More the electronegative elements attached on P, more is the partial positive charge, more is the extent of back-bonding, more is the planarity. Since, F is the most electronegative among these, so $P_3N_3F_6$ is most planar.

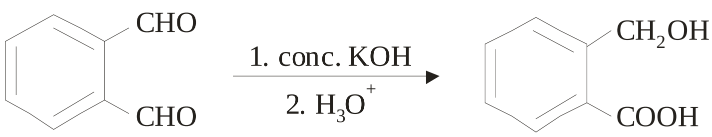
55. (A)



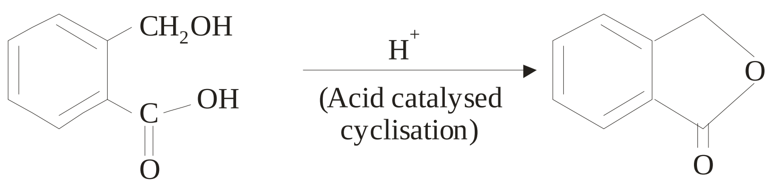
Phenyl Isocyanide

56. (C)
Steric inhibition of resonance is expected in case of substitution at ortho-position. So, (C) is correct.

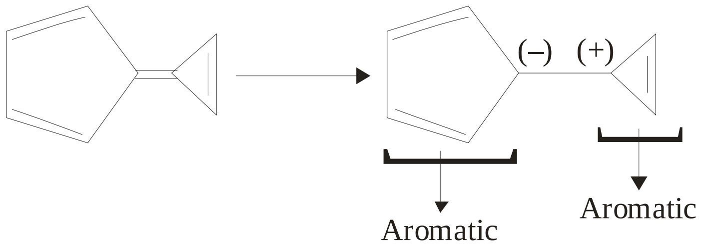
57. (A)



(Cannizaro's Reaction)

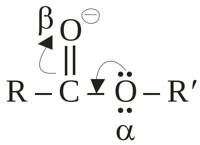


58. (B)



59. (B)

60. (B)



Hence, O denoted by β is more basic due to negative charge.