Daily Tutorial Sheet-4	Level-1

46.(A) At equivalence point there appears salt of strong acid & weak base. Hence pH < 7

47.(D) $pH = pK_{In} + \log \frac{[In^-]}{[HIn]}$

48.(B) If initial conc. of $\underset{\text{(formic acid)}}{HCOOH} = C$

At half neutralization,

$$[HCOOH] = \frac{C}{2}$$

$$[HCOO^-Na^+] = \frac{C}{2} \quad \Rightarrow \quad pH = pKa$$

49.(A) Only methyl red has colour transition pH range (CTPR) in acidic range where equivalence point will lie. Litmus CTPR is 5 – 8 and others indicators too have CTPR overlapping with basic range of pH.

50.(B) Fact based

51.(C) On adding equal volumes of two solutions the concentration of all the ions is halved.

For precipitation I.P. > K_{sp}

52.(C) $Hg_2Cl_2 \longrightarrow Hg_2^{2+} + 2Cl^-$

$$\begin{array}{ccc} S & - & - \\ - & S & 2S \end{array}$$

$$4S^3 = K_{sp} \quad \Rightarrow \quad S = \left(\frac{K_{sp}}{4}\right)^{1/3}$$

53.(B) $AB(s) \rightleftharpoons A^+(aq) + B^-(aq)$

$[B] = 10^{-4}$ will make $Q > K_{sp}$

54.(D) After mixing $[Ca^{2+}] = \frac{1}{200}$; $[Cl^-] = \frac{2}{200}$; $[Na^+] = \frac{2}{1000}$; $[SO_4^{2}] = \frac{1}{1000}$

I.P. of $CaSO_4 = 5 \times 10^{-6} (< K_{sp})$ hence no precipitate

55.(C) Precipitation is observed as I.P. > K_{sp}

56.(C) Since K_{sp} of CuCl is very high compared to AgCl.

$$\left[Cl^-\right] = \left[Cl^-\right]_{\text{from AgCl}} + \left[Cl^-\right]_{\text{from CuCl}} \approx \left[Cl^-\right]_{\text{from CuCl}} = 10^{-3}$$

For AgCl

$1.6 \times 10^{-10} = [Ag^+] \times 10^{-3} \quad \Rightarrow \quad [Ag^+] = 1.6 \times 10^{-7}$ Hence x = 7

57.(D) $S(AgCl) = \sqrt{1.1 \times 10^{-10}}$ $\qquad S(AgI) = \sqrt{1.0 \times 10^{-16}}$

$S(PbCrO_4) = \sqrt{4 \times 10^{-14}}$ $\qquad S(Ag_2CO_3) = \sqrt[3]{\frac{8 \times 10^{-12}}{4}}$

58.(B) For precipitation

IP > K_{sp}

$[Zn^{2+}][S^{2-}] > K_{sp}$

$[Cu^{2+}][S^{2-}] > K_{sp}$

59.(C) I.P. $(Ag_2CrO_4) = (10^{-4})^2 \times 10^{-5} = 10^{-13}$ $(< K_{sp}, Ag_2CrO_4)$

Do not precipitate

I.P. of $AgCl = 10^{-4} \times 10^{-5} = 10^{-19}$ $(> K_{sp}, AgCl)$

$AgCl$ is precipitated

60.(B) $[Ba^{2+}] = \dfrac{K_{sp}}{[CO_3^{2-}]} = \dfrac{5.1 \times 10^{-9}}{10^{-4}} = 5.1 \times 10^{-5} M$