Daily Tutorial Sheet-9	Level-2

106.(D) Methyl orange has CTPR (colour transition pH range) purely in acidic range where equivalence point will lie. Phenol red CTPR is 6.8 to 8.2

107.(A) Equivalence point will lie in acidic range hence phenolphthalein cannot be used

108.(D) Let 'v' ml of HCl is used reach equivalence point

$$2.5\times\frac{2}{5}=V\times\frac{2}{15}\quad\Rightarrow\quad V=7.5\,\text{ml}$$

Number of moles of salt formed $=1\,\text{m mole}$

Final total volume $=2.5+7.5=10\,\text{ml}$

Final conc. of salt $=\frac{1}{10}=0.1\text{M}$

$$K_h=\frac{K_w}{K_b}=\frac{10^{-14}}{10^{-12}}=10^{-2}\quad\Rightarrow\quad K_h=\frac{Ch^2}{1-h}\qquad\text{(we cannot assume } (1-h)\approx 1)$$

Solve quadratic to find 'h', here, $h = 0.27$

$$[H^+]=Ch=0.1\times 0.27=2.7\times 10^{-2}\text{M}$$

109.(D) After $(1/4)^{th}$ neutralization

$$\frac{[\text{Salt}]}{[\text{Acid}]}=\frac{1/4}{3/4}=\frac{1}{3}$$

$$pH=pK_a+\log\frac{1}{3}$$

After $(3/4)^{th}$ neutralization

$$\frac{[\text{Salt}]}{[\text{Acid}]}=\frac{3/4}{1/4}=\frac{3}{1}$$

$$pH=pK_a+\log 3$$

$$\Delta pH=\log 3-\log\frac{1}{3}=2\log 3$$

110.(B) After $(1/4)^{th}$ neutralization

$$\frac{[\text{Salt}]}{[\text{Acid}]}=\frac{1/3}{2/3}=\frac{1}{2}$$

$$pH=pK_a+\log\frac{[\text{Salt}]}{[\text{Acid}]}=5-\log 2$$

111.(B) $BaSO_4$ has lowest value of K_{sp}

112.(ABCD)

In presence of alkaline medium, concentration of sulphide ion will increase, thus all ions gets precipitated

113.(B) Most appropriate choice

114.(D) $H_2S(aq)\rightleftharpoons 2H^+(aq)+S^{2-}(aq)$

115.(B) Lower the K_{sp}, lower is the solubility (All the salts are of the type AB)