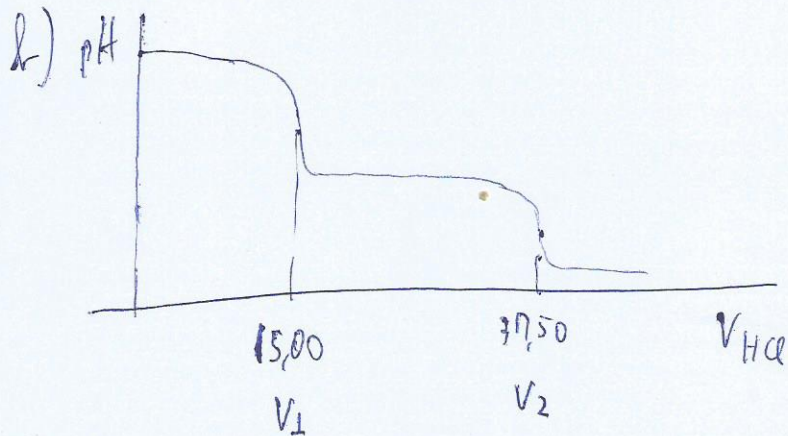


HOMEWORK 5 - GABARITO

a) HCO_3^- reage com OH^- .

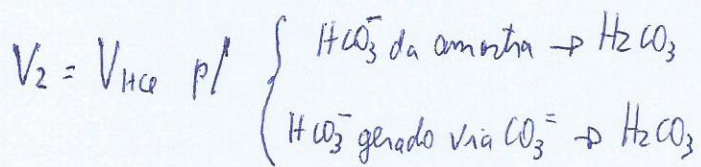
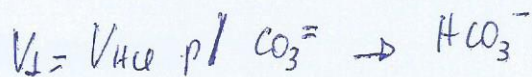
- No 1º ponto estequiométrico tem-se HCO_3^- , que é anfótero, ∴ $\text{pH} = \frac{\text{p}K_1 + \text{p}K_2}{2} \approx 8,3$
 ∴ o indicador é a fenolftaleína

- No 2º ponto estequiométrico forma-se H_2CO_3 , que deixa a solução ~ ácida
 ∴ o indicador é o vermelho de metila



Como $V_2 - V_1 > V_1$, conclui-se

que a solução contém CO_3^{2-} e HCO_3^-

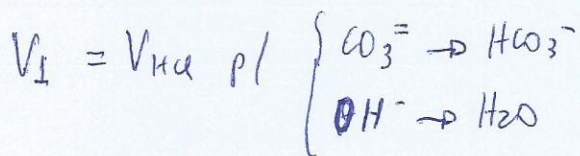
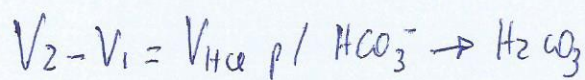
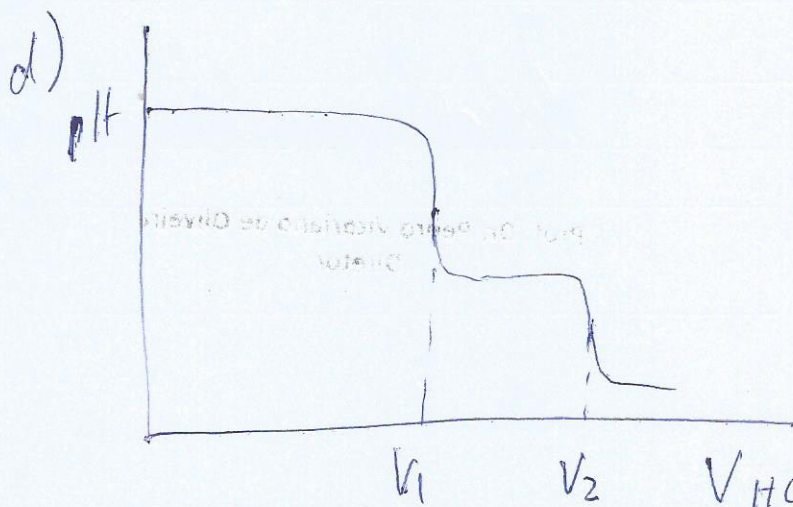


$$n_{\text{CO}_3^{2-}} = 1,5 \times 10^{-3} \text{ mol}, \quad n_{\text{HCO}_3^-} = 7,5 \times 10^{-4} \text{ mol}$$

$$c) \quad C_{\text{CO}_3^{2-}} = \frac{1,5 \times 10^{-3} \text{ mol}}{0,1 \text{ L}} = 1,5 \times 10^{-2} \text{ M}$$

$$C_{\text{HCO}_3^-} = \frac{7,5 \times 10^{-4} \text{ mol}}{0,1 \text{ L}} = 7,5 \times 10^{-3} \text{ M}$$

$$K_2 = \frac{[\text{CO}_3^{2-}][\text{H}^+]}{[\text{HCO}_3^-]} \Rightarrow [\text{H}^+] = \frac{K_2 \times 7,5 \times 10^{-3}}{1,5 \times 10^{-2}}$$



$$n_{\text{CO}_3^{2-}} = 0,10 \frac{\text{mol}}{\text{L}} \times 20 \times 10^{-3} \text{ L} = 2 \times 10^{-3} \text{ mol}$$

$$n_{\text{OH}^-} = 0,05 \frac{\text{mol}}{\text{L}} \times 20 \times 10^{-3} \text{ L} = 1 \times 10^{-3} \text{ mol}$$

$$n_{\text{HCl}} \text{ p/ } \text{CO}_3^{2-} \rightarrow \text{HCO}_3^- = 2 \times 10^{-3} \text{ mol} \quad \therefore V_{\text{HCl}} = \frac{2 \times 10^{-3}}{0,1} = 20 \times 10^{-3} \text{ L} = \underline{20 \text{ mL}}$$

$$n_{\text{HCl}} \text{ p/ } \text{OH}^- \rightarrow \text{H}_2\text{O} = 1 \times 10^{-3} \text{ mol} \quad \therefore V_{\text{HCl}} = \frac{1 \times 10^{-3}}{0,1} = 10 \times 10^{-3} \text{ L} = \underline{10 \text{ mL}}$$

∴ $V_1 = 30 \text{ mL}$ e $V_2 = 50 \text{ mL}$