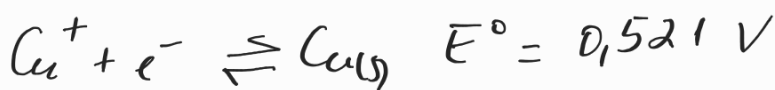




$$a) E_{\text{Cu}} = 0,337 - \frac{0,0592}{2} \log\left(\frac{1}{0,0380}\right) = 0,295\text{V}$$

$$b) K_{\text{ps CuCl}} = 1,9 \times 10^{-7} = [\text{Cu}^+][\text{Cl}^-] \Rightarrow [\text{Cu}^+] = \frac{1,9 \times 10^{-7}}{[\text{Cl}^-]}$$



$$E_{\text{Cu}} = 0,521 - \frac{0,0592}{1} \log\left(\frac{1}{[\text{Cu}^+]}\right) = 0,521 - 0,0592 \log\left(\frac{[\text{Cl}^-]}{1,9 \times 10^{-7}}\right)$$

$$= 0,521 - 0,0592 \log\left(\frac{0,0650}{1,9 \times 10^{-7}}\right) = 0,521 - 0,328 = 0,193\text{V}$$

$$c) K_{\text{ps Cu(OH)}_2} = 4,8 \times 10^{-20} = [\text{Cu}^{2+}][\text{OH}^-]^2$$

$$E_{\text{Cu}} = 0,337 - \frac{0,0592}{2} \log\left(\frac{1}{[\text{Cu}^{2+}]}\right) = 0,337 - \frac{0,0592}{2} \log\left(\frac{[\text{OH}^-]^2}{K_{\text{ps}}}\right)$$

$$= 0,337 - \frac{0,0592}{2} \log\left(\frac{(0,0350)^2}{4,8 \times 10^{-20}}\right) = 0,337 - 0,486 = -0,149\text{V}$$

$$d) \beta_4 = 5,62 \times 10^{11} = \frac{[\text{Cu(NH}_3)_4^{2+}]}{[\text{Cu}^{2+}][\text{NH}_3]^4}$$

$$E_{\text{Cu}} = 0,337 - \frac{0,0592}{2} \log\left(\frac{\beta_4 [\text{NH}_3]^4}{[\text{Cu(NH}_3)_4^{2+}]}\right) \cdot \frac{1}{[\text{Cu}^{2+}]} = \frac{5,62 \times 10^{11} (0,100)^4}{0,0375}$$

$$= 0,337 - \frac{0,0592}{2} \log 2,04 \times 10^{11} = 0,337 - 0,276 = 0,061\text{V}$$

e) $\alpha_4 = \frac{[Y^{4-}]}{CT}$ onde CT é a [EDTA] não complexado.

α_4 no pH 4 é dado na figura 17-4. $\alpha_4 = 3,61 \times 10^{-9}$

$$\frac{[CuY^{2-}]}{[Cu^{2+}]_{CT}} = \alpha_4 K_{CuY} = (3,61 \times 10^{-9}) \times (6,3 \times 10^{18}) = 2,3 \times 10^{10}$$

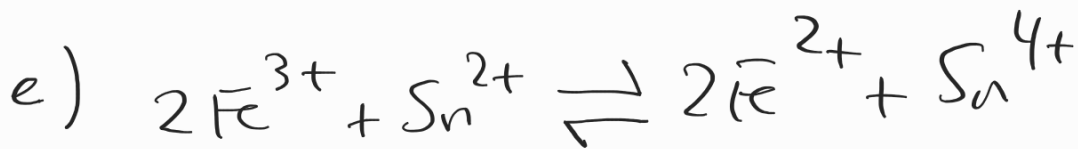
↳ Tabela 17-3 pág 439.

$$E_{Cu} = 0,337 - \frac{0,0592}{2} \log\left(\frac{1}{[Cu^{2+}]}\right) = 0,337 - \frac{0,0592}{2} \log\left(\frac{\alpha_4 K_{CuY} CT}{[CuY^{2-}]}\right)$$

$$= 0,337 - \frac{0,0592}{2} \log\left(\frac{2,3 \times 10^{10} (0,0351)}{3,90 \times 10^{-3}}\right) = 0,337 - 0,335 =$$

$$= 0,002 \text{ V}$$

Q2.



quant. Sn^{2+} consumida = $0,0918 \frac{\text{mol}}{L} \times 25,00 \text{ mL} =$

2,295 mmol

quant. Fe^{3+} consumida = $0,1568 \frac{\text{mol}}{L} \times 25,00 \text{ mL} =$

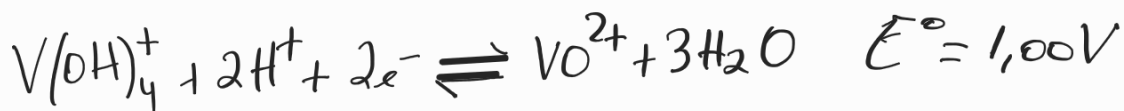
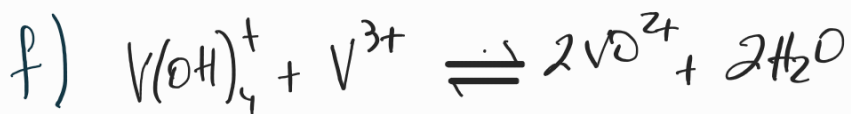
3,920 mmol

$$\text{quant. Sn}^{4+} \text{ formado} = 3,920 \text{ mmol Fe}^{3+} \times \frac{1 \text{ mmol Sn}^{4+}}{2 \text{ mmol Fe}^{3+}} = 1,960 \text{ mmol}$$

$$\text{quant. Sn}^{2+} \text{ sobrou} = 2,295 - 1,960 = 0,335 \text{ mmol}$$

$$E_{\text{Pt}} = 0,154 - \frac{0,0592}{2} \log \left(\frac{[\text{Sn}^{2+}]}{[\text{Sn}^{4+}]} \right)$$

$$E_{\text{Pt}} = 0,154 - \frac{0,0592}{2} \log \left[\frac{(0,335/50)}{(1,960/50)} \right] = 0,154 - (0,023) = 0,177 \text{ V}$$



$$\text{quant. V(OH)}_4^+ \text{ consumida} = 0,0832 \frac{\text{mol}}{\text{L}} \times 25,00 \text{ mL} = 2,08 \text{ mmol}$$

$$\text{quant. V}^{3+} \text{ consumida} = 0,01087 \frac{\text{mol V}_2(\text{SO}_4)_3}{\text{L}} \times \frac{2 \text{ mol V}^{3+}}{1 \text{ mol V}_2(\text{SO}_4)_3} \times 50,0 \text{ mL} = 1,087 \text{ mmol}$$

$$\text{Quant. VO}^{2+} \text{ formado} = 1,087 \text{ mmol V}^{3+} \times \frac{2 \text{ mmol VO}^{2+}}{1 \text{ mmol V}^{3+}} = 2,174 \text{ mmol}$$

$$\text{Quant. } V(OH)_4^+ \text{ sobrou} = 2,08 - 1,087 = 0,993 \text{ mmol}$$

$$E_H = 1,00 - \frac{0,0592}{2} \log \frac{[VO^{2+}]}{[V(OH)_4^+][H^+]^2}$$

0,02899

$\rightarrow 2,174/75$
 $(0,100)^2$ 0,01
 $\frac{0,993}{75}$ 0,01324

$$E_{pH} = 1,00 - 0,0693 = 0,931 \text{ V}$$

Corrigir o gabarito da lista.