Analytical chemistry (5th Edition)

LuMg

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1 Chapter 10

1.

$$A = -lgT = K^{\cdot}c = 2.5 * 10^4 * c$$
$$T_1 = 10^{-2.5*10^4*4*10^{-6}} = 79\%$$
$$T_2 = 10^{-2.5*10^4*8*10^{-6}} = 63\%$$
$$T_3 = 10^{-2.5*10^4*12*10^{-6}} = 50\% \tag{1}$$
$$T_4 = 10^{-2.5*10^4*16*10^{-6}} = 40\%$$
$$T_5 = 10^{-2.5*10^4*20*10^{-6}} = 32\%$$

2.

$$-lgT = A$$
$$T = 0.6$$
$$A = 0.22$$
$$When b = 1cm :$$
$$T = 78\%$$
$$A = 0.11 \tag{2}$$
$$When b = 3cm :$$
$$T = 47\%$$
$$A = 0.33$$

3.

$$minimize E_r :$$
$$T = 0.368$$
$$-lgT = A = 1.3 * 10^4 * \frac{m * 0.12\%}{M_{Ni} * 0.1} \tag{3}$$
$$m = 0.163g$$

4.

$$c = \frac{25.5 * 10^{-6}/M_{Cu}}{50 * 10^{-3}} = 8.1 * 10^{-6} mol/L$$
$$A = -lgT = 0.297$$
$$\epsilon = \frac{A}{2cm * c} = 1.83 * 10^4 L \cdot mol^{-1} \cdot cm^{-1}$$

(4)

5.

$$A = 0.434 = -lgT$$
$$T = 0.368$$
$$E_r = \frac{dT}{TlnT} = \frac{0.05\% * 0.368}{0.368 * ln0.368} = 0.05\%$$

(5)

6.

$Linearly:$

$$0.24 = \epsilon_{ML_x} * \frac{7.12 * 10^{-4} * 2 * 10^{-3}}{x * 25 * 10^{-3}} + \epsilon_{Fe} * \frac{7.12 * 10^{-4} * 2 * 10^{-3} * (1 - \frac{1}{x})}{25 * 10^{-3}}$$
$$0.36 = \epsilon_{ML_x} * \frac{7.12 * 10^{-4} * 2 * 10^{-3}}{x * 25 * 10^{-3}} + \epsilon_{Fe} * \frac{7.12 * 10^{-4} * 2 * 10^{-3} - 7.12 * 10^{-4} * 3 * 10^{-3}/x}{25 * 10^{-3}}$$
$$0.48 = \epsilon_{ML_x} * \frac{7.12 * 10^{-4} * 2 * 10^{-3}}{x * 25 * 10^{-3}} + \epsilon_{Fe} * \frac{7.12 * 10^{-4} * 2 * 10^{-3} - 7.12 * 10^{-4} * 4 * 10^{-3}/x}{25 * 10^{-3}}$$
$$...$$
$$x = 3$$
$$Fe(Phen)_3$$

(6)

7.

$$0.2 = \epsilon_{450,Cr_2O_7} * 10^{-3}$$
$$0.05 = \epsilon_{530,Cr_2O_7} * 10^{-3}$$
$$0.42 = \epsilon_{530,KMnO_4} * 10^{-4}$$
$$Let:$$
$$c_{Cr_2O_7} = c_1$$
$$c_{KMnO_4} = c_2$$
$$Given:$$
$$\epsilon_{450,Cr_2O_7} * c_1 = 0.38$$
$$\epsilon_{530,Cr_2O_7} * c_1 + \epsilon_{530,KMnO_4} * c_2 = 0.710$$
$$c_1 = 1.9 * 10^{-3} mol/L$$
$$c_2 = 1.46 * 10^{-4} mol/L$$

(7)

8.

$$T_0 = 10^{-A_0} = 0.2$$
$$T_x = 10^{-A_x} = 0.1$$
$$= 10\%$$
$$Let:$$
$$T_{0r} = 100\%$$
$$T_{xr} = 50\%$$
$$A_{xr} = -lgT_{xr} = 0.301$$

(8)

9.

$$T_0 = 0.2$$
$$A_0 = -lgT_0 = 0.70 = \epsilon * b * c_0$$
$$A_x = -lgT_x = -lg(T_0 * 40.0\%) = \epsilon * b_{cx}$$
$$c_x = 15.7mg/mL$$

(9)

10.

$$c_{Ti,0} = \frac{50 * 1.06 * 10^{-3}}{100}$$
$$c_{V,0} = \frac{25 * 6.28 * 10^{-3}}{100}$$
$$\epsilon_{Ti,415} * c_{Ti,0} = 0.435$$
$$\epsilon_{Ti,455} * c_{Ti,0} = 0.246$$
$$\epsilon_{V,415} * c_{V,0} = 0.251$$
$$\epsilon_{V,455} * c_{V,0} = 0.377$$
$$\epsilon_{Ti,415} * c_{Ti,x} + \epsilon_{V,415} * c_{V,x} = 0.645$$
$$\epsilon_{Ti,455} * c_{Ti,x} + \epsilon_{V,455} * c_{V,x} = 0.555$$
$$c_{Ti,x} = 5.38 * 10^{-4}mol/L$$
$$c_{V,x} = 1.27 * 10^{-3}mol/L$$
$$Original:$$
$$c_{Ti,x,original} = 5 * c_{Ti,x} = 2.69 * 10^{-3}mol/L$$
$$c_{V,x,original} = 5 * c_{V,x} = 6.35 * 10^{-3}mol/L$$

(10)

11.

$$c_{NO_2^-} = c_1$$
$$c_{NO_3^-} = c_2$$
$$\frac{23.3}{25} * c_1 + 7.24 * c_2 = 1.01$$
$$23.3 * c_1 = 0.73$$
$$c_1 = 0.313 mol/L$$
$$c_2 = 0.0992 mol/L$$

(11)

12.

$$A = -lgT = -lg0.42 = 2.5 * 10^{-3} * 2 * c$$
$$c = \frac{0.001}{100 * M} * 1000$$
$$M = 132.7 g/mol$$

(12)

13.

$$A = -lgT = -lg0.08 = 10^4 * c$$
$$c = 1.1 * 10^{-4} mol/L$$
$$\frac{0.08}{0.368} = \frac{T_r}{1.00}$$
$$T_r = 0.217$$
$$-lgT_r = 10^4 * c_r$$
$$c_r = 7.69 * 10^{-5} mol/L$$

(13)