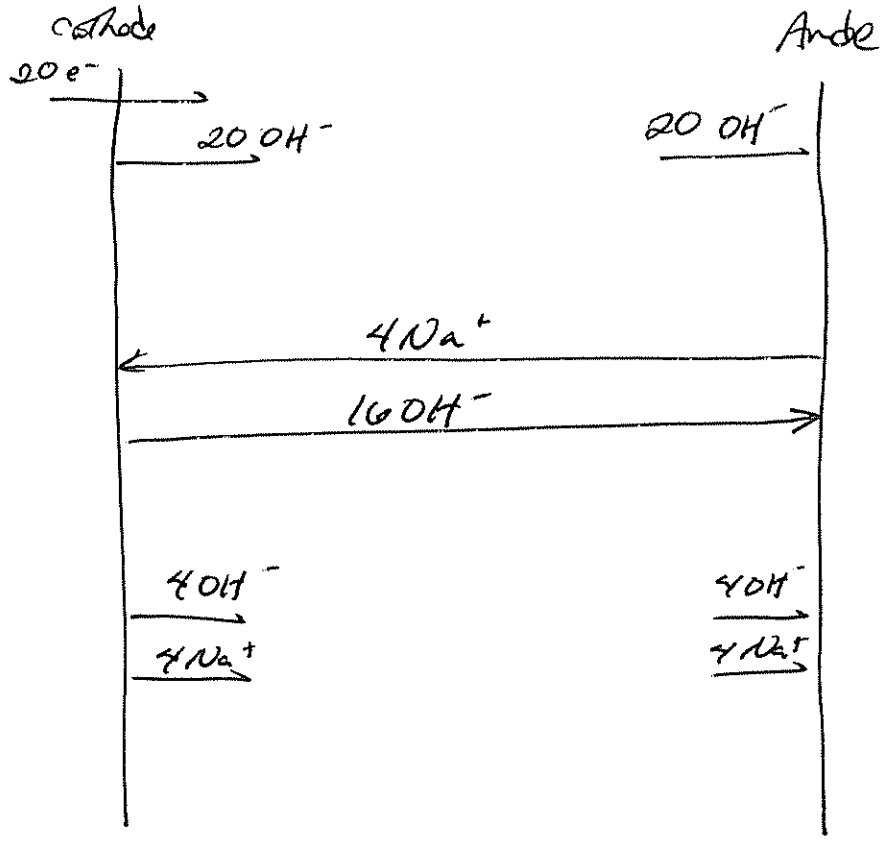
Chapter 4: Problem Solutions

4.1

0.10 M NaOH



$u_{Na^+} = 5.193 \times 10^{-4}$

$u_{OH^-} = 2.05 \times 10^{-3}$

$$t_{Na^+} = \frac{(1)(5.193\times10^{-4})(0.1)}{(1)(5.193\times10^{-4})(0.1) + (1)(2.05\times10^{-3})(0.1)}$$

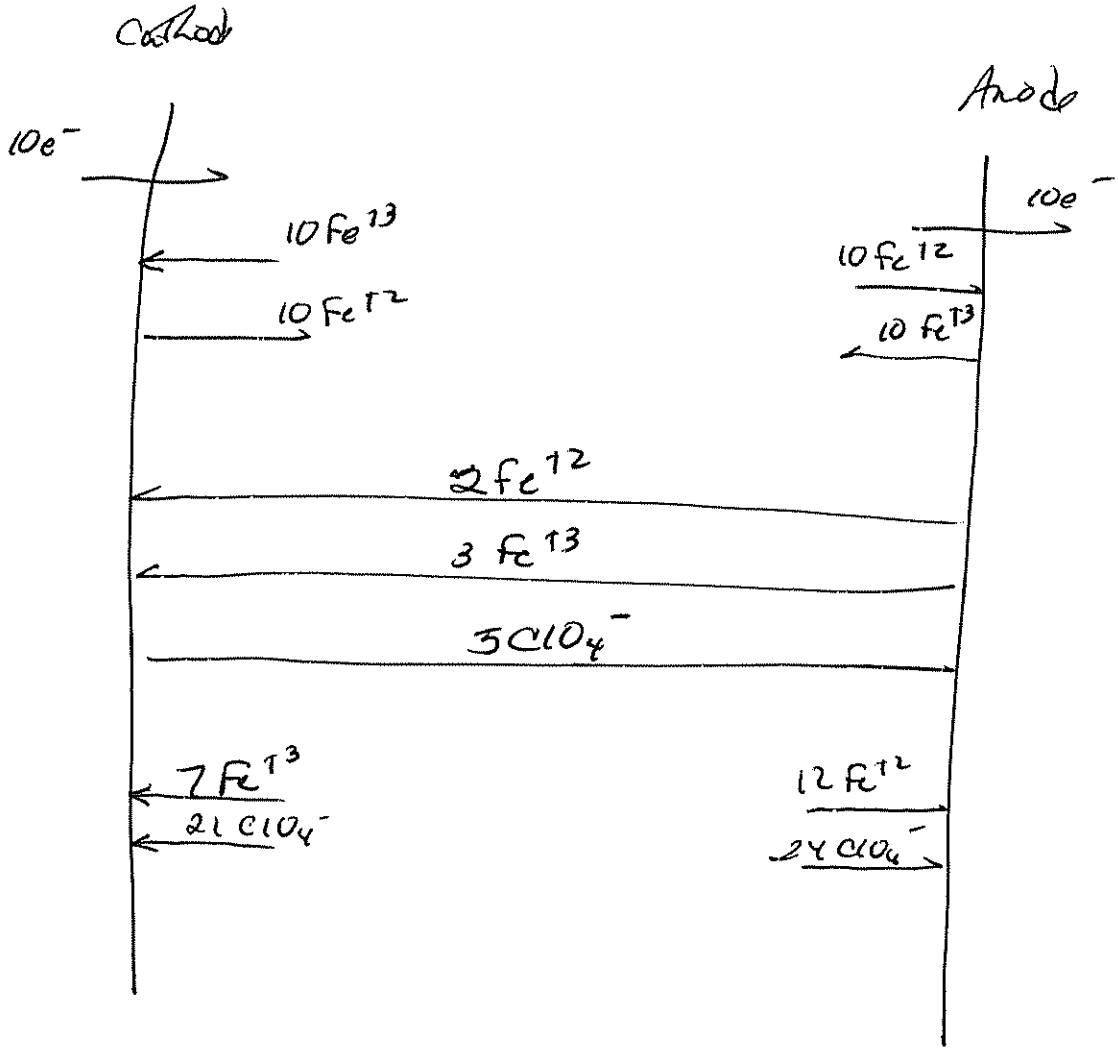
$= 0.20$

$t_{OH^-} = 0.80$

4.2

$$Fe^{+2} \rightarrow Fe^{+3} + e^-$$

$$Fe^{+3} + e^- \rightarrow Fe^{+2}$$



$[Fe^{+2}] = 0.1\ M$

$[Fe^{+3}] = 0.1\ M$

$[ClO_4^-] = 0.5\ M$

$$t_{Fe^{+2}} = \frac{(2)(0.1)(1)}{(2)(0.1)(1) + (3)(0.1)(1) + (1)(0.5)(1)}$$

$$= 0.2$$

$$t_{Fe^{+3}} = 0.3$$

$$t_{ClO_4^-} = 0.5$$

4.3 The diffusion distance is given by $l = \sqrt{2Dt}$

for a 100 sec. exp.

$$l = \left[(2)\left(1.0\times10^{-5}\ \frac{cm^2}{sec}\right)(100\ sec)\right]^{1/2}$$

$$l = 0.0447\ cm$$

The wall needs to be 5× the distance away from the electrode.

$$5 \times 0.0447 = \underline{0.223\ cm}$$