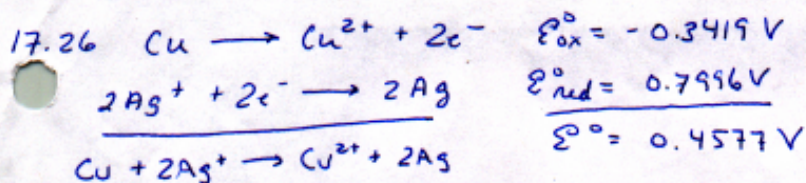


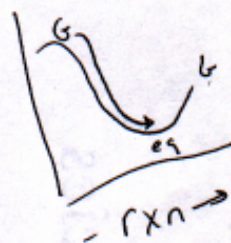
17.25 (a) zero, the system is at equilibrium so no drive to go anywhere  
 (b)  $E = E^{\circ}$



~~$$E = E^{\circ} - \frac{RT}{nF} \ln Q$$~~

$$E = E^{\circ} - \frac{RT}{nF} \ln Q$$

$$= 0.4577 - \frac{0.05916 \text{ V}}{2} \log \frac{[\text{Cu}^{2+}]}{[\text{Ag}^{+}]^2}$$



plugging into above Nernst equation:

(a) 0.4577 V (b) 0.4399 V (c) 0.50 V (d) 0.4488 V

17.27 (a)  $\Delta G^{\circ} = -nFE^{\circ} = -2 \text{ molee}^{-} \times \frac{96485 \text{ C}}{\text{molee}^{-}} \times \frac{0.4577 \text{ J}}{\text{C}} = -8.832 \times 10^4 \text{ J}$

$K = \exp \frac{-\Delta G}{RT} = 2.97 \times 10^{15}$  BIG!

(b) if  $G=0 = -nFE$ , then @ equilibrium  $Q=K$

$K = \frac{[\text{Cu}^{2+}]}{[\text{Ag}^{+}]^2} = 2.97 \times 10^{15} \quad [\text{Ag}^{+}] = \sqrt{\frac{1.000}{2.97 \times 10^{15}}} = 1.83 \times 10^{-8} \text{ M}$

(c)  $[\text{Ag}^{+}] = \sqrt{\frac{[\text{Cu}^{2+}]}{K}} = \sqrt{\frac{5.000}{2.97 \times 10^{15}}} = 4.10 \times 10^{-8} \text{ M}$

(d)  $[\text{Cu}^{2+}] = K [\text{Ag}^{+}]^2 = (2.97 \times 10^{15})(1.000)^2 = 2.97 \times 10^{15} \text{ M}$

the equilibrium constant is huge so reaction goes essentially to completion and we get lots of  $\text{Cu}^{2+}$  and not much  $\text{Ag}^{+}$

17.28  $E = E^{\circ} - \frac{0.05916 \text{ V}}{2} \log \frac{[\text{Cu}^{2+}]}{[\text{Ag}^{+}]^2} = 0.4577 - \frac{0.05916 \text{ V}}{2} \log \frac{1.000 \text{ M}}{[\text{Ag}^{+}]^2}$

(a) solve for  $[\text{Ag}^{+}]$ :  $\log \frac{1.000 \text{ M}}{[\text{Ag}^{+}]^2} = \frac{n(E^{\circ} - E)}{0.05916 \text{ V}} = \frac{2(0.4577 \text{ V} - 0.5000 \text{ V})}{0.05916 \text{ V}} = -1.430$

$[\text{Ag}^{+}] = \sqrt{\frac{[\text{Cu}^{2+}]}{10^{-1.430}}} = \sqrt{\frac{1}{10^{-1.430}}} = 5.19 \text{ M}$

(b) as above,  $[\text{Ag}^{+}] = 1.1 \text{ M}$

(c)  $[\text{Ag}^{+}] = 0.231 \text{ M}$