CHM 112 (Quiz 12)

Name_____ Show all work and draw a box around your final answer.

1. A galvanic cell is to be prepared from an aluminum electrode, a silver electrode, and one molar solutions of $Al(NO_3)_3$ and $Ag(NO_3)$.

Section_____

$Al^{3+}(aq) + 3e^{-} \longrightarrow Al(s)$	$\varepsilon^{\circ} = -1.676 \text{ V}$
$\operatorname{Ag}^+(aq) + e^- \longrightarrow \operatorname{Ag}(s)$	$\varepsilon^{\circ} = +0.800 \text{ V}$

(a) Draw the electrochemical cell with all necessary components. Clearly label the electrodes, solutions, potentiometer, salt bridge, etc. (4 pts)

- (b) Using standard reduction potentials, determine which electrode is the anode and which electrode is the cathode. Label these on your diagram above. (4 pts)
- (c) On your diagram label the direction of electron flow. (2 pts)
- (d) Write a balanced chemical equation for the cell reaction which is spontaneous as written. $(2 \ pts)$
- (e) Now diagram the cell using standard cell notation. (2 pts)

(f) A current of 1.75 A is observed to flow through the wire for 2.5 hours. How many moles of electrons pass through the wire during this time? (2 pts)

- (g) Which electrode gains mass: Ag or Al (circle one)? (2 pts)
- (h) The electrode that decomposes initially weighs 20.00 grams. What is its mass after the 1.75 A current flows for 2.50 hours. (2 pts)

(i) Using the Nernst equation,

$$E_{\rm cell} = E_{\rm cell}^{\circ} - \frac{RT}{nF} \ln Q$$

determine E_{cell} using the information provided.

(5 pts)