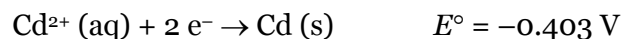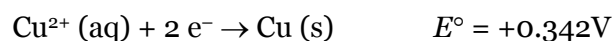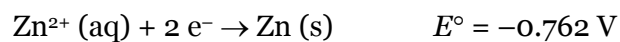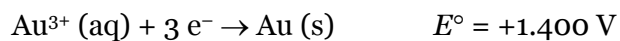1. Given the following half reactions and standard reduction potentials, write the cell (line) diagram for the Galvanic/voltaic cell with the <u>largest</u> standard cell potential ($E°_{cell}$).

$$Au^{3+} (aq) + 3\ e^- \rightarrow Au\ (s) \qquad E° = +1.400\ V$$
$$Cl_2\ (g) + 2\ e^- \rightarrow 2\ Cl^-\ (aq) \qquad E° = +1.358\ V$$
$$Zn^{2+} (aq) + 2\ e^- \rightarrow Zn\ (s) \qquad E° = -0.762\ V$$
$$Cu^{2+} (aq) + 2\ e^- \rightarrow Cu\ (s) \qquad E° = +0.342V$$
$$Cd^{2+} (aq) + 2\ e^- \rightarrow Cd\ (s) \qquad E° = -0.403\ V$$

2. How long will it take to plate 0.0625 g of solid copper from an aqueous solution of Cu^{2+} with a current of 0.200 A? Note: 1 A = 1 C/s and F = 96,500 C/mol e^-

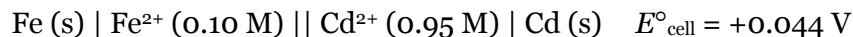3. You construct the following Galvanic/voltaic cell at 298.15 K.

    Pt (s) | Cr^{2+} (0.30 M), Cr^{3+} (2.00 M) || Co^{2+} (0.20 M) | Co (s) $E°_{cell}$ = +0.220 V

    What will the potential of the cell be after 0.10 M of Cr^{2+} is consumed?

    Assume that volume and temperature do not change.

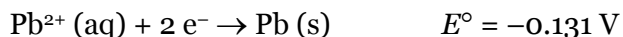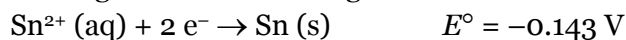4. You construct the following Galvanic/voltaic cell at 298.15 K.

$$\text{Fe (s)} \mid \text{Fe}^{2+} \text{ (0.10 M)} \mid\mid \text{Cd}^{2+} \text{ (0.95 M)} \mid \text{Cd (s)} \quad E°_{cell} = +0.044 \text{ V}$$

The initial mass of the Fe electrode is 100.0 g and the volumes of the solutions are 1.00 L each. What will the cell potential be when the mass of the Fe electrode is 62.0 g? {Fe = 55.85 g/mol}

Assume that temperature does not change.

5. You construct a voltaic cell using the two reactions given.

$$\text{Sn}^{2+} \text{ (aq)} + 2 \text{ e}^- \rightarrow \text{Sn (s)} \qquad E° = -0.143 \text{ V}$$

$$\text{Pb}^{2+} \text{ (aq)} + 2 \text{ e}^- \rightarrow \text{Pb (s)} \qquad E° = -0.131 \text{ V}$$

If the cell starts with $[\text{Sn}^{2+}] = 1.35$ M and $[\text{Pb}^{2+}] = 2.11$ M at 281 K, what will be the concentration of Pb^{2+} when the cell is "dead"?

6. Consider a voltaic cell with the following cell diagram at 298.15 K.

$$\text{Pb (s)} \mid \text{Pb}^{2+} \text{ (1.00 M)} \mid\mid \text{Cu}^+ \text{ (1.00 M)} \mid \text{Cu (s)}$$

A) What will happen to the cell potential if $[\text{Pb}^{2+}]$ is doubled?

      Increases   Decreases   Stays the same

B) What will happen to the cell potential if $[\text{Cu}^+]$ is doubled?

      Increases   Decreases   Stays the same

C) What will happen to the cell potential if we added enough water to double the volumes of both the anodic and cathodic solutions?

      Increases   Decreases   Stays the same