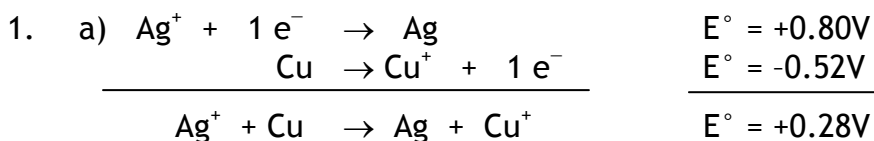
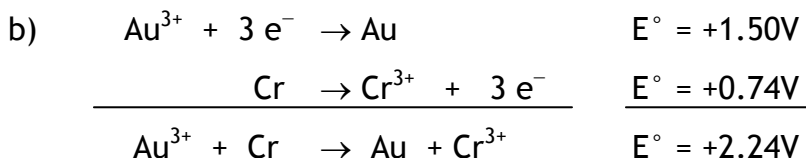


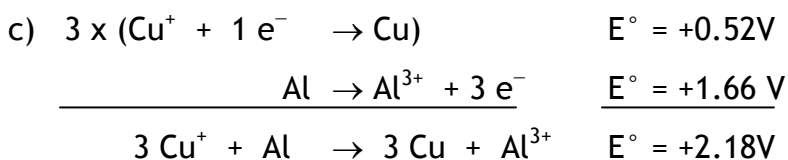
Module 6 Lesson 2 Exercises Answer Key



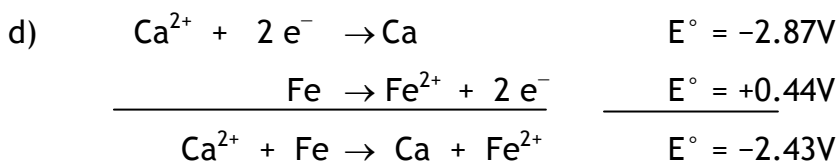
Spontaneous, cell potential is positive.



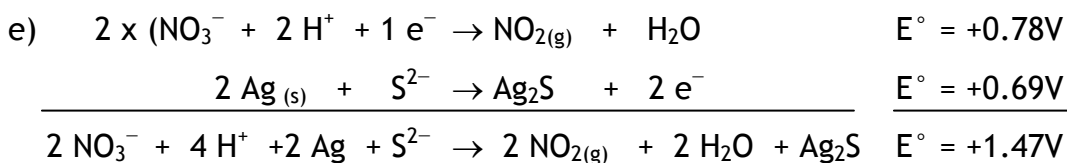
Spontaneous



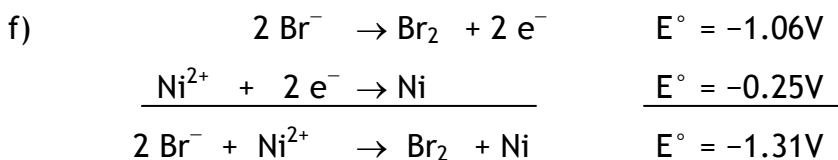
Spontaneous



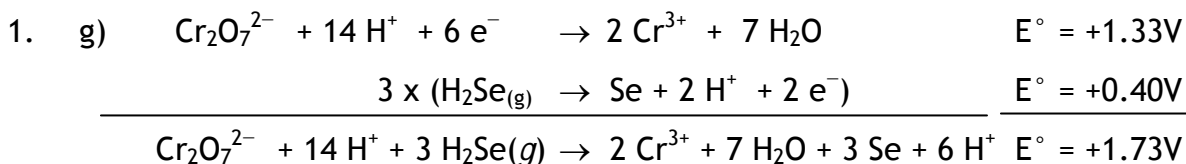
Not spontaneous, cell potential is negative.



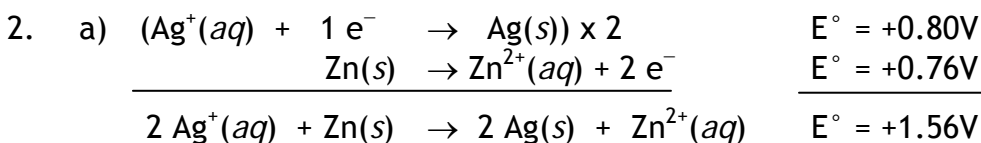
Spontaneous



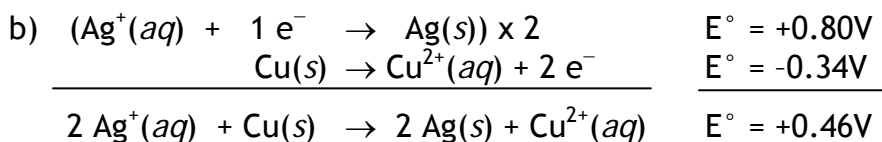
Not Spontaneous



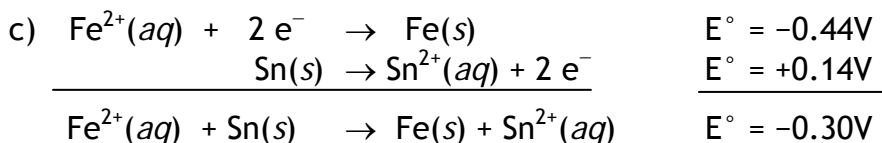
Spontaneous



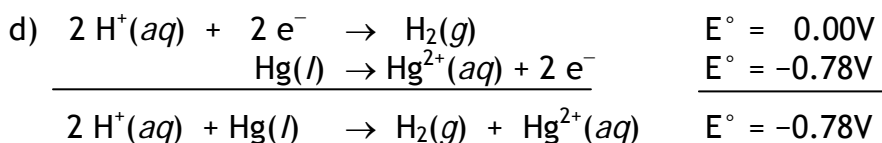
Spontaneous, cell potential is positive.



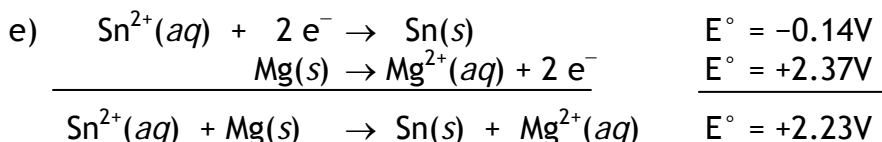
Spontaneous, cell potential is positive.



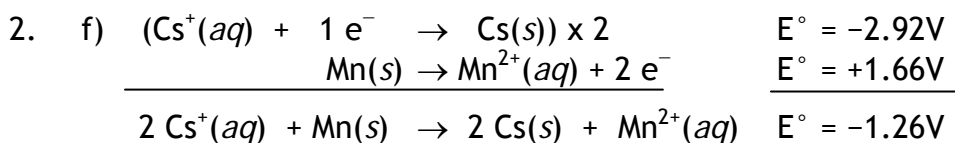
Not Spontaneous, cell potential is negative.



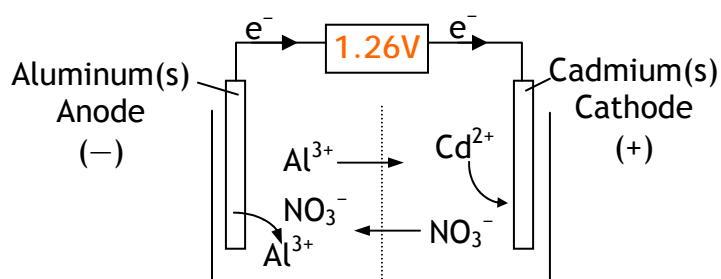
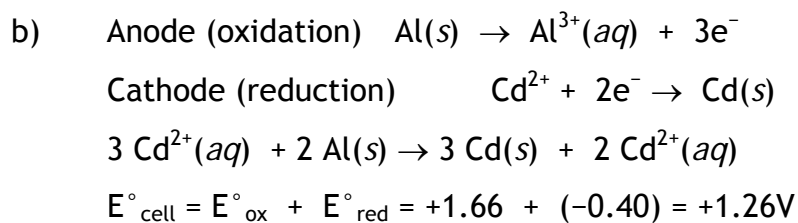
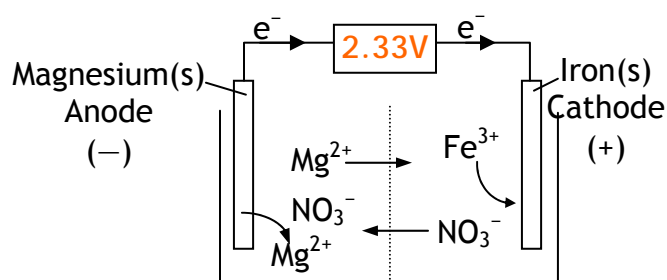
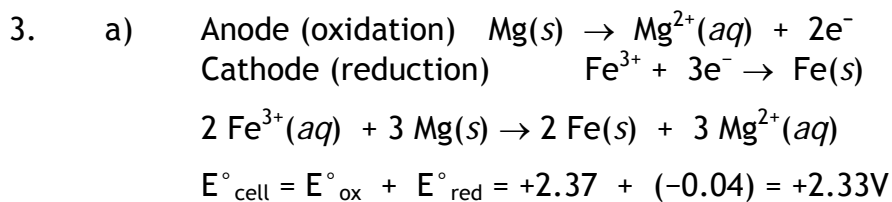
Not Spontaneous, cell potential is negative.



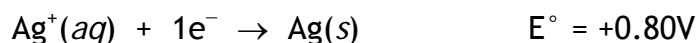
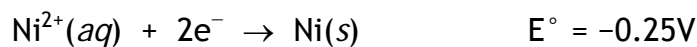
Not Spontaneous, cell potential is negative.



Not Spontaneous, cell potential is negative.

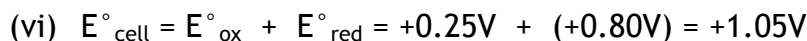
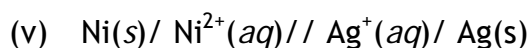
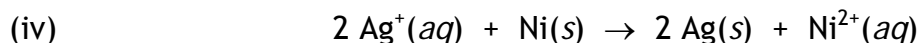
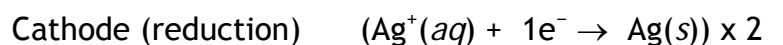


4. a) Write the reduction reactions:

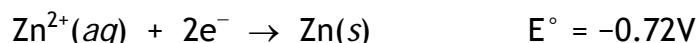
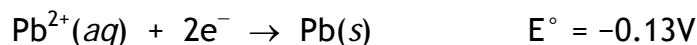


(i) Silver is more easily reduced (greatest tendency to attract electrons) so it is the cathode.

(ii) Nickel metal is the anode.

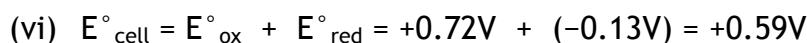
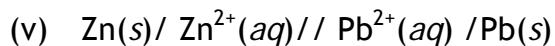
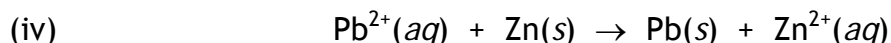


b) Write the reduction reactions:

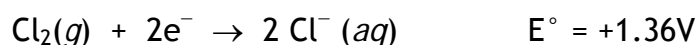
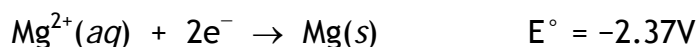


(i) Lead is more easily reduced (more positive E°) so it is the cathode.

(ii) Nickel metal is the anode.



c) Write the reduction reactions:

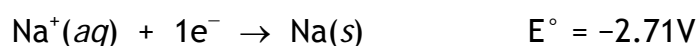
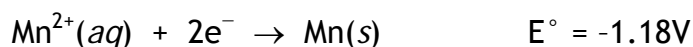


(i) Chlorine is more easily reduced (more positive E°) so it is the cathode.

(ii) Magnesium metal is the anode.

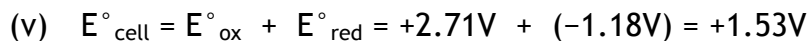
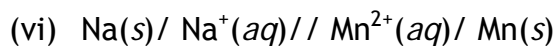
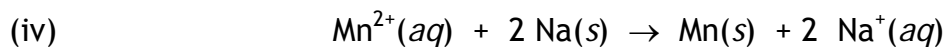
4. c) (iii) Anode (oxidation) $\text{Mg}(s) \rightarrow \text{Mg}^{2+}(aq) + 2e^{-}$
 Cathode (reduction) $\text{Cl}_2(g) + 2e^{-} \rightarrow 2\text{Cl}^{-}(aq)$
 (iv) $\text{Cl}_2(g) + \text{Mg}(s) \rightarrow 2\text{Cl}^{-}(aq) + \text{Mg}^{2+}(aq)$
 (v) $\text{Mg}(s) / \text{Mg}^{2+}(aq) // 2\text{Cl}^{-}(aq) / \text{Cl}_2(g) / \text{Pt}(s)$
 since chlorine is a gas, need a platinum electrode
 (v) $E^{\circ}_{\text{cell}} = E^{\circ}_{\text{ox}} + E^{\circ}_{\text{red}} = +2.37\text{V} + (+1.36\text{V}) = +3.73\text{V}$

d) Write the reduction reactions:

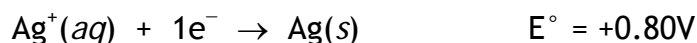
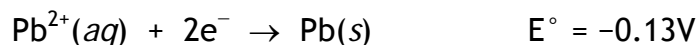


(i) Manganese is more easily reduced so it is the cathode.

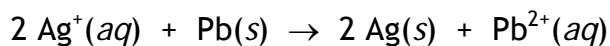
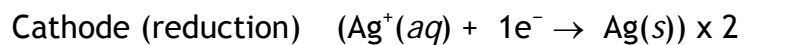
(ii) Sodium metal is the anode.



5. Write the reduction reactions:

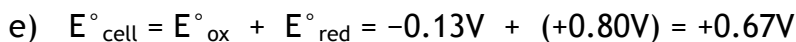


a) Reduction occurs in the cathode half-cell. Silver is the cathode.



c) Lead is the anode.

d) Electrons move from the lead half-cell to the silver half-cell.



5. f) Decreasing the lead ion concentration causes a shift in the reaction to the right, increasing the voltage.
- g) Adding hydrogen sulfide to the cathode half-cell produces S^{2-} ions. The sulfide ions react with the silver ions to produce a Ag_2S precipitate. The Ag^+ ion concentration decreases, causing a shift in the equilibrium to the left. This will decrease the cell's voltage.