ROSEDALE ACADEMY

SCH4U 5-3D: Galvanic Cell Practice Questions

1. A galvanic cell is constructed using the following materials:

- Strip of nickel metal
- Strip of magnesium metal
- $NiSO_{4(aq)}$
- $MgSO_{4(aq)}$
- $Na_2SO_{4(aq)}$
- Connecting wires
- U-shaped tube
- 2 beakers

a) Draw and label a diagram of the cell.
b) Identify the anode and the cathode.
c) Label the direction of electron flow.
d) Identify the oxidizing and reducing agents.
e) Write the equations for the half reactions in the cell.
f) Write the net ionic equation for the cell reaction.

2. Describe how to predict the spontaneity of the redox reaction in a galvanic cell:

3. For the following reactions, predict whether they will occur spontaneously:

a) $Mg_{(s)} + Au^{3+}_{(aq)} \rightarrow Mg^{2+}_{(aq)} + Au_{(s)}$

b) $Cu_{(s)} + Mg^{2+}_{(aq)} \rightarrow Cu^{+}_{(aq)} + Mg_{(s)}$

c) $Zn_{(s)} + Sn^{2+}_{(aq)} \rightarrow Zn^{2+}_{(aq)} + Sn_{(s)}$

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4. Given the following reactions that occur in two-half cells, for this reaction to occur spontaneously, determine:

$Ni^{2+}_{(aq)} + 2e^- \rightarrow Ni_{(s)}$

$Zn^{2+}_{(aq)} + 2e^- \rightarrow Zn_{(s)}$

a) Which reaction should occur at the cathode and which should occur at the anode.

b) The cell potential for the spontaneous reaction.