

Unit 5 – Chapter 16: Electrochemistry

Name \_\_\_\_\_

Assignment #2:  $E^0$  for Voltaic Cells

Period \_\_\_\_\_

1) Calculate  $E^0$  for the following voltaic cells:

- $\text{Pb}_{(s)} + 2 \text{Ag}^+_{(aq)} \rightarrow \text{Pb}^{2+}_{(aq)} + 2 \text{Ag}_{(s)}$
- $\text{O}_{2(g)} + 4 \text{Fe}^{2+}_{(aq)} + 4 \text{H}^+_{(aq)} \rightarrow 2 \text{H}_2\text{O}_{(l)} + 4 \text{Fe}^{3+}_{(aq)}$
- A Cd-Cd<sup>2+</sup> half-cell and an Zn-Zn<sup>2+</sup> half-cell

2) Using Table 18.1, calculate  $E^0$  for the reaction between

- chromium (II) ions and tin (IV) ions to produce chromium (III) ions and tin (II) ions.
- manganese (II) ions and hydrogen peroxide to produce solid manganese dioxide (MnO<sub>2</sub>).

3) Calculate  $E^0$  for the following cells:

- $\text{Pb} \mid \text{PbSO}_4 \parallel \text{Pb}^{2+} \mid \text{Pb}$
- $\text{Pt} \mid \text{Cl}_2, \text{ClO}_3^- \parallel \text{O}_2, \text{H}_2\text{O} \mid \text{Pt}$
- $\text{Pt} \mid \text{OH}^-, \text{O}_2 \parallel \text{ClO}_3^-, \text{Cl}^- \mid \text{Pt}$  (basic medium)

4) Which of the following reactions is/are spontaneous at standard conditions?

- $\text{Zn}_{(s)} + 2 \text{Fe}^{3+}_{(aq)} \rightarrow \text{Zn}^{2+}_{(aq)} + 2 \text{Fe}^{2+}_{(aq)}$
- $\text{Cu}_{(s)} + 2 \text{H}^+_{(aq)} \rightarrow \text{Cu}^{2+}_{(aq)} + \text{H}_{2(g)}$
- $2 \text{Br}^-_{(aq)} + \text{I}_{2(s)} \rightarrow \text{Br}_{2(l)} + 2 \text{I}^-_{(aq)}$