Name_____ Period _____

Honors Chemistry
Electrochemistry Practice Test

Form P

Part I: Determine the oxidation number of vanadium in the following compounds:

1. V_2O_5 1._____

2. VO_4^{3-} 2._____

3. VCl_3 3._____

4. VO^{3+} 4._____

5. VC 5._____

Part II: Balance the following equations:
a. in acid:

$$Zn + NO_3^- \leftrightarrows Zn^{2+} + NH_4^+$$

$$Cr_2O_7^{2-}(aq) + Cl^-(aq) \leftrightarrows Cr^{3+}(aq) + Cl_2(g)$$

b. in base:

$$Zn + NO_3^- \leftrightarrows NH_3 + [Zn(OH)_4]^{2-}$$

$$CN^-(aq) + MnO_4^-(aq) \leftrightarrows CNO^-(aq) + MnO_2(s)$$

Part III: Determine if the following reactions are spontaneous using an EMF table:

1. $2Fe^{3+} + Co(s) \leftrightarrows Co^{2+} + Fe^{2+}$

2. $Sr(s) + 2H^+ \leftrightarrows Sr^{2+} + H_2(g)$

3. $F_2 + 2Br^- \leftrightarrows 2F^- + Br_2$

4. $Na + Cl_2 \leftrightarrows Na^+ + 2Cl^-$

5. $I_2 + 2F^- \leftrightarrows 2I^- + F_2$

Part IV: Identify the species that is oxidized and the one that is reduced. Identify the oxidizing and reducing agents. If it is not a redox reaction write none for both answers.

1.

$$2CuCl \leftrightarrows 2Cu + CuCl_2$$

Oxidized _____ Reduced _____

Oxidizing Agent _____ Reducing Agent _____

2.

$$C_3H_8 + O_2 \leftrightarrows CO_2 + H_2O$$

Oxidized _____ Reduced _____

Oxidizing Agent _____ Reducing Agent _____

3.

$$SiCl_4 + 2H_2O \leftrightarrows 4HCl + SiO_2$$

Oxidized _____ Reduced _____

Oxidizing Agent _____ Reducing Agent _____

4.

$$Zn(s) + HCl(aq) \leftrightarrows Zn^{2+}(aq) + H_2(g)$$

Oxidized _____ Reduced _____

Oxidizing Agent _____ Reducing Agent _____

Part V: Electrochemical Cells.

Draw an electrochemical cell based on the reaction between Zinc and Copper. Write the overall spontaneous reaction that occurs and calculate the EMF for the cell. Label the anode, cathode, salt bridge, show the ion flow, flow of electrons, positive electrode, and negative electrode. Show which electrode grows and which one shrinks.

Part VI: Definitions

Provide definitions for the following terms.

Oxidation

Reduction

Oxidizing Agent

Reducing Agent

EMF

Anode

Cathode

Salt Bridge