# Electrochemistry Review

1. An unknown metal (not Zn) is placed in a solution of $ZnCl_2$ with no apparent effect. In a $Pb(NO_3)_2$ solution, the metal appears to be coated with some material. What does this suggest about the metal's tendency to oxidize?

2. Consider the following reactions:

   $2X^- + Y_2 \rightarrow 2Y^- + X_2$ (spontaneous)

   $2W^- + Y_2 \rightarrow 2Y^- + W_2$ (not spontaneous)

   $2Z^- + X_2 \rightarrow 2X^- + Z_2$ (spontaneous)

   List the order of the ions arranged from strongest to weakest tendency to reduce.

3. During an experiment using four unknown metals and their aqueous ions, a student recorded the following data:

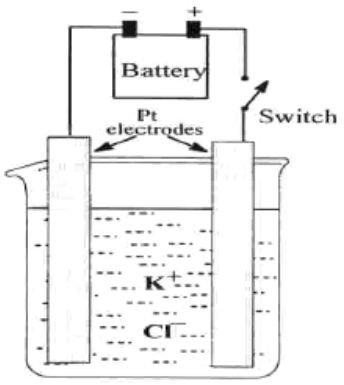
   (R = reaction; NR = no reaction)

| | **Ions** | | | |
|---|---|---|---|---|
| **Metals** | **$A^+$** | **$B^+$** | **$C^+$** | **$D^+$** |
| **A** | NR | R | R | NR |
| **B** | NR | NR | NR | NR |
| **C** | NR | R | NR | NR |
| **D** | R | R | R | NR |

   List the ions in order of strongest oxidizing agent to weakest oxidizing agent.

4. Sketch a nickel/tin electrochemical cell.
   a. Label the anode, cathode, direction of electron flow and ion movement.
   b. Write the half-reactions and the net reaction.
   c. Calculate the total cell voltage, $E_{cell}$.

5. The diagram shows the electrolysis of molten KCl.




   a. List the half-reactions.
   b. Which electrode does each ion move to when the switch is closed?

6. If we electrolyze a solution of $Ni^{2+}(aq)$ to form Ni(s) and use a current of 0.15 amps for 10 minutes, how many grams of Ni(s) are produced?