Quiz: Electrochemical Cells

An electrochemical cell is to be assembled using the overall reaction:

$$Cd_{(s)} + 2\,AgNO_{3\,(aq)} \longrightarrow Cd(NO_3)_{2\,(aq)} + 2\,Ag_{\,(s)}$$

$$Cd^{+2} + 2e^- \rightleftharpoons Cd \qquad E^0 = -0.14\ V$$
$$Ag^{+1} + e^- \rightleftharpoons Ag \qquad E^0 = 0.80\ V$$

A) What is oxidized in this process?

B) Write the equation for that half-reaction which is an *oxidation process*.

C) Do the negative ions serve any useful purpose in the operation of the cell? Explain.

D) Diagram the half-cell in which oxidation occurs. Label the electrode and the solution around it. (It will be convenient here to use the porous cup as a container for the half-cell).

E) What is the electrode called which is undergoing oxidation?

F)Write the equation for that half-reaction which is a *reduction process*. Diagram the half-cell for this process and identify the material used for the electrode and the compound dissolved in the solution.

G) What is the name of the electrode in the half-cell where reduction is occurring?

H) Combine the half-cells of parts (D) and (F) to give a complete cell; then indicate the *direction of electron flow* in the external circuit. Indicate the direction of *movement of positive ions* in the cell. Indicate the direction of *movement of negative ions* in the cell. Which half-cell electrode would be labelled negative?

I) Suppose 2 moles of silver atoms were deposited. How many moles of cadmium atoms would dissolve? How many grams of Cd would dissolve if 2.0 g of silver metal plated out?

J) Write the cell diagram (using standard cell notation) for this cell, including the net cell voltage.

K) As the cell operates, what will happen to each of the electrodes?

L) What is the function of the porous pot?