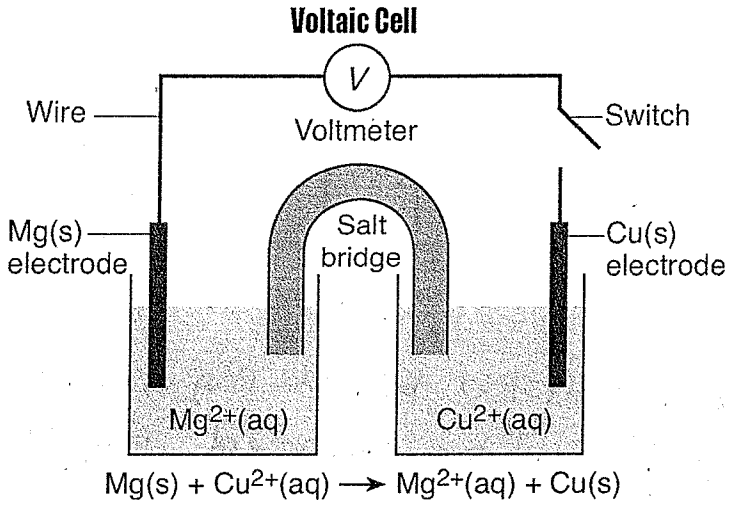
Name: _____

Unit 13 Part 2 Review

Questions 1 and 2 refer to the following:

A voltaic cell with magnesium and copper electrodes is shown in the diagram below.



The copper electrode has a mass of 15.0 grams. When the switch is closed, the reaction in the cell begins. The balanced ionic equation for the reaction in the cell is shown beneath the cell diagram. After several hours, the copper electrode is removed, rinsed with water, and dried. At this time, the mass of the copper electrode is greater than 15.0 grams.

1) State the direction of electron flow through the wire between the electrodes when the switch in the given diagram is closed.

from the Mg electrode (anode) to the Cu electrode (cathode)

2) State the purpose of the salt bridge in the cell shown.

It allows ions to flow between the 2 half-cells

3) Given the redox reaction:

$$Ni(s) + Pb^{2+}(aq) \rightleftharpoons Ni^{2+}(aq) + Pb(s)$$

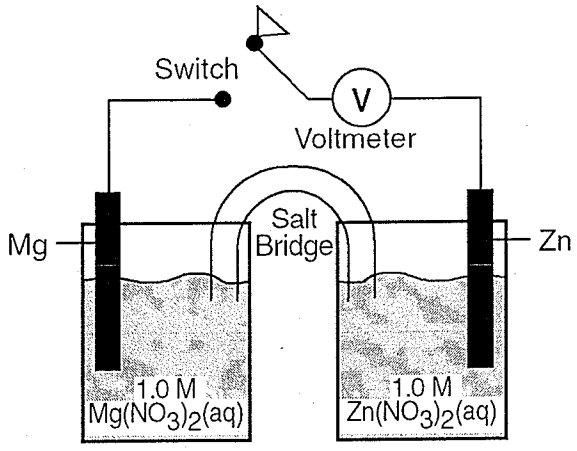
(a) According to the *Activity Series* chemistry reference table, would this reaction occur spontaneously in a voltaic cell? [*Give evidence to support your answer.*] Yes, because Ni is above Pb on Table J, so Ni is oxidized and Pb^{+2} is reduced.

(b) Describe the transfer of electrons that occurs during this reaction.

The electrons are transferred from Ni to Pb^{+2}

Questions 4 and 5 refer to the following:

The diagram below represents a voltaic cell at 298 K and 1 atmosphere.



4) Which electrode is the cathode? [*Explain why.*]

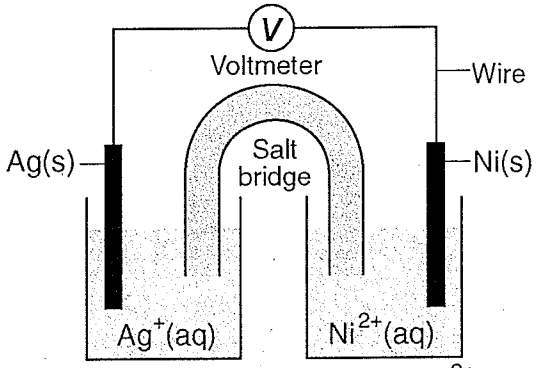
Zn, Zn is listed below Mg on Table J and therefore Zn^{+2} will be reduced by Mg^0.

5) Write the correct half-reaction for the reduction that occurs.

$Zn^{+2} + 2e^- \rightarrow Zn^0$

Questions 6 and 7 refer to the following:

The diagram below represents an operating voltaic cell at 298 K and 1.0 atmosphere in a laboratory investigation. The reaction occurring in the cell is represented by the balanced ionic equation below.



$2Ag^+(aq) + Ni(s) \rightarrow 2Ag(s) + Ni^{2+}(aq)$

×2 ×2

6) Determine the total number of moles of $Ni^{2+}(aq)$ ions produced when 4.0 moles of $Ag^+(aq)$ ions completely react in the cell shown.

2.0 mol Ni^{+2}

7) Write a balanced half-reaction equation for the reduction that occurs in the cell shown.

$Ag^{+1} + 1e^- \rightarrow Ag^0$