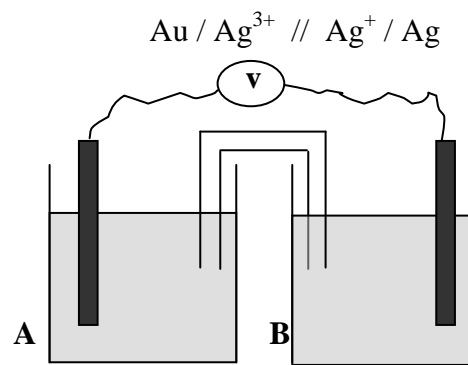
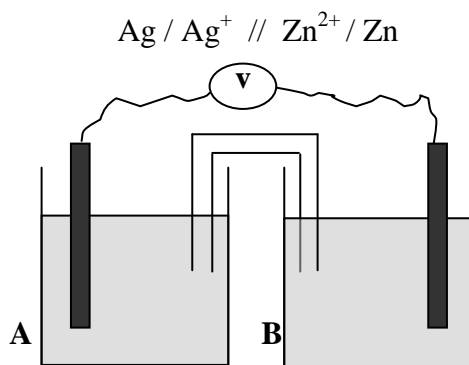


1. **Drawing electrochemical cells.** On each diagram **a)** label the anode & cathode **b)** show the electron flow **c)** write half rxns/ net rxn & calculate cell potential. (5 marks each = 20 marks)



1/2 rx(A) $E^\circ = \dots\dots\dots \text{V}$

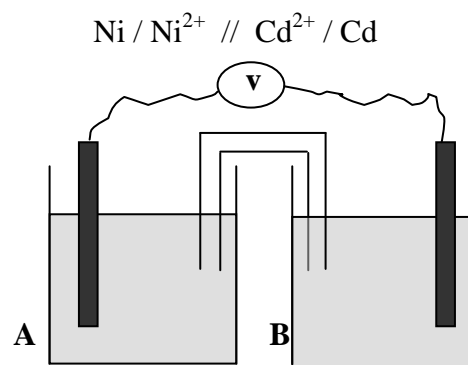
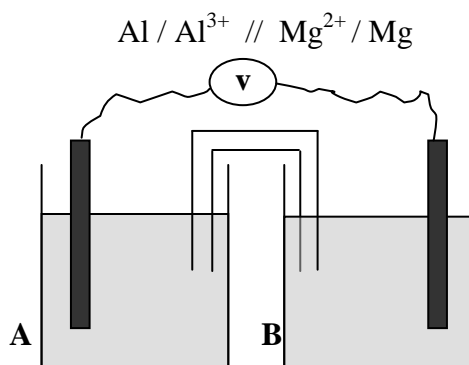
1/2 rx(A) $E^\circ = \dots\dots\dots \text{V}$

1/2 rx(B) $E^\circ = \dots\dots\dots \text{V}$

1/2 rx(B) $E^\circ = \dots\dots\dots \text{V}$

cell rx $E^\circ = \dots\dots\dots \text{V}$

cell rx $E^\circ = \dots\dots\dots \text{V}$



1/2 rx(A) $E^\circ = \dots\dots\dots \text{V}$

1/2 rx(A) $E^\circ = \dots\dots\dots \text{V}$

1/2 rx(B) $E^\circ = \dots\dots\dots \text{V}$

1/2 rx(B) $E^\circ = \dots\dots\dots \text{V}$

cell rx $E^\circ = \dots\dots\dots \text{V}$

cell rx $E^\circ = \dots\dots\dots \text{V}$

2. a) Examine the chart of electric cells on **pg 689** – Describe 3 types of commercial electric cells. (6 marks)

b) Do question #5 on **pg 694** (3 marks)

3. Which substance(s) will oxidize Br^- to Br_2 ? a) Cl_2 b) H^+ c) Ni^{2+} d) MnO_4^- (1 mark)

4. Which substance(s) will reduce Br_2 to Br^- ? a) Cl^- b) H_2 c) Ni d) Mn^{2+} (1 mark)

Refer to spontaneity when answering questions 5-7.

5. If a piece of copper metal is dipped into a 1 M Cr^{3+} sol'n, what will happen? (1 mark)

6. What will happen if an aluminum spoon is used to stir a sol'n of $\text{Fe}(\text{NO}_3)_2$? What kind of spoon would be better? (2 marks)

7. Can a 1 M $\text{Fe}_2(\text{SO}_4)_3$ sol'n be stored in a container made of nickel? Why/Why not? (1 mark)

8. How many a) coulombs then b) moles of electrons are passed through a electrolysis cell by (6 marks)

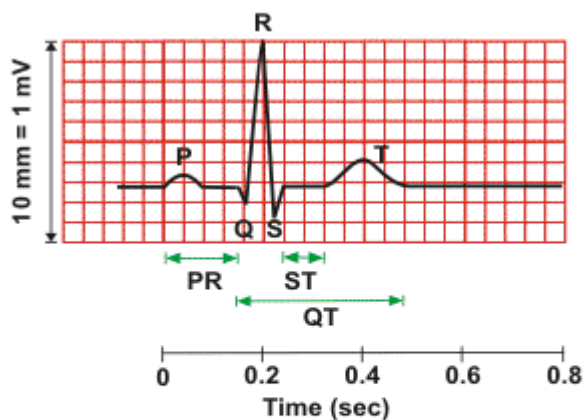
i) a current of 40 A for 600 min ii) a current of 100 A for 2 days iii) a current of 40 000 A for 7 days

9. How many moles of Cr^{3+} would be reduced to Cr by the same amount of electricity that produces 12.0 g of Ag from a sol'n of AgNO_3 ? If a current of 4.0 A was used for this reduction, how many minutes would this electrolysis take? (2 marks)

Application Questions (17 marks)

10. a) Define action potential & resting potential in cell membranes. (2 marks)
b) Define depolarization of cell membranes. Be sure to state whether the cell becomes more or less negative. (2 marks)
c) Briefly describe how neurons transfer signals to your brain through the process of depolarization. (5 marks)
d) Botox is an example of a depolarization blocking drug. Explain how botox works and what the result of a botox injection is. (3 marks)

11. The human heart uses electrochemical pathways to pump blood throughout the body. Essentially the depolarization in different areas of the heart stimulates contraction and relaxation of the various muscles within the heart. An electrocardiogram measures these changes in charge. Look at the picture of a sample ECG reading below:



P wave (0.08 - 0.10 s) QRS (0.06 - 0.10 s)
P-R interval (0.12 - 0.20 s) Q-T_c interval (≤ 0.44 s)*
*QT_c = QT / √RR

Describe what the isoelectric line, P wave, QRS complex and the T wave mean. How would changes in the appearance of the different waves inform you about which parts of the heart are not transferring charge effectively? (5 marks)

Lab (/15)

12. Redox Reactions: Write the following:

- **Purpose:** 2-3 sentences stating why we performed this lab
- **Observations:** record any results taken in lab
- **Sample calculations:** for calculations done, do **1 sample calculation** to show how values were determined
- **Conclusion:** state reactions performed, and explain errors/discrepancies found in your experiments