Voltaic Cells & Electrochemistry

SCH4U | Student laboratory assignment | 1 of 4

Prepare for your investigation

Name: _____ Date: _____ Class: _____

Research question

How do electrode identity and electrolyte ion concentration influence the potential of a voltaic cell?

Learning goal: use the virtual model to gather evidence, explain voltaic cells & electrochemistry and communicate a supported conclusion.

Materials: WorksheetGalaxy virtual laboratory, this assignment, calculator or spreadsheet if needed. Virtual observations only; do not recreate hazardous procedures or perform physical fitness tests without teacher approval.

1. Define two relevant scientific terms from the Background Information tab. (K/U)

2. Write a prediction or hypothesis with a scientific reason. (K/U, T/I)

3. Identify the variable or feature compared, the measured outcome and constants or consistent observation criteria. (T/I)

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Perform the virtual laboratory

Open the corresponding virtual lab and read Background Information. Follow the investigation instructions below. Record authentic simulated results; do not invent data.

Investigation A — Compare metal pairs

- Choose Zn/Cu, Fe/Cu, and Cu/Ag electrode combinations.
- Set both ion concentrations to 1.00 mol/L and install the salt bridge.
- Measure and record the predicted voltage for each cell.
- Identify anode, cathode, electron flow, and the balanced overall reaction.

Investigation B — Concentration and voltage

Use Zn and Cu electrodes at 25°C.

- Keep $[Zn^{2+}]$ = 1.00 M. Vary $[Cu^{2+}]$ through 0.01, 0.10, 0.50, 1.00, and 2.00 M.
- Record the voltage for each trial and graph Ecell versus $\log_{10}([Zn^{2+}]/[Cu^{2+}])$.
- Use the Nernst equation to explain the observed relationship.

Record each completed observation using the simulator’s record control when available. Use Data & Graphs to review results. Export CSV if available; attach additional rows or screenshots when needed.

Record the exact settings and any changes to the method.

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Observations & results

Enter the actual results. Keep trial IDs consistent between continued tables. Attach the full exported data or extra sheets when the procedure requires more rows. Include units as displayed.

Data table 1

Trial / item	Anode	Cathode	[Anode ion] M	[Cathode ion] M	E°cell (V)

Data table 1 — continued (2)

Trial / item	Ecell (V)	$\log_{10} Q$

Qualitative observations / sample calculation (show units where applicable)

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Analysis, conclusion & assessment

4. Present a labelled graph of a measured relationship, or an annotated diagram / comparison chart for qualitative investigations. Attach it separately. Explain the pattern using recorded evidence. (C, T/I)

5. Analysis: identify oxidation/reduction half-reactions, balance the overall reaction, and show a sample E°cell and Nernst calculation. (K/U, A)

6. Explain electrode polarity, electron flow, and the effect of concentration on voltage. (K/U, A)

Conclusion and evaluation: answer the research question, revisit the prediction using evidence, identify a model limitation and propose an improvement. (T/I, A)

Submit this assignment plus your completed Lab Report (printed or saved as PDF from the lab) and any supporting data/figures.

K/U: accurate concepts /10	T/I: method, data, reasoning /12	C: clear tables, units, report /8	A: explanation, conclusion, transfer /10

Total: /40