

Galvanic Cells and Cell Notation

Student Worksheet | g10_u06_w22

I can: interpret a supplied galvanic-cell model using oxidation/reduction, electron-flow, ion-migration, and cell-notation conventions.

Supplied model: $\text{Zn(s)}|\text{Zn}^{2+}(\text{aq}, 1.0 \text{ M})||\text{Cu}^{2+}(\text{aq}, 1.0 \text{ M})|\text{Cu(s)}$. The external wire connects the electrodes and a salt bridge contains mobile ions. Treat the diagram as a model card only—do not assemble cells, handle metal salts, or connect electrical equipment. In this galvanic model, oxidation occurs at the anode and reduction at the cathode.

half-cell card	notation / transport card
$\text{Zn(s)} \rightarrow \text{Zn}^{2+}(\text{aq}) + 2\text{e}^-$	= phase boundary; = salt bridge/liquid junction electrons: external wire only; ions: bridge/solutions notation is written anode $\rightarrow$ cathode for this model
$\text{Cu}^{2+}(\text{aq}) + 2\text{e}^- \rightarrow \text{Cu(s)}$	
overall: $\text{Zn(s)} + \text{Cu}^{2+}(\text{aq}) \rightarrow \text{Zn}^{2+}(\text{aq}) + \text{Cu(s)}$	

1. Which supplied half-reaction is oxidation? Cite electron placement.

2. Which supplied half-reaction is reduction? Cite electron placement.

3. Identify the anode in this galvanic model.

4. Identify the cathode in this galvanic model.

5. State the direction of electron flow through the external wire.

6. Do electrons travel through the salt bridge in this model? Explain.

7. At the Zn half-cell, positive Zn^{2+} accumulates. Which type of salt-bridge ion moves toward that half-cell?

8. At the Cu half-cell, Cu^{2+} is removed from solution. Which type of salt-bridge ion moves toward that half-cell?

9. Explain how the salt bridge helps maintain charge balance without serving as the electron path.

10. Predict the mass change of the Zn electrode. Explain from the oxidation half-reaction.

11. Predict the mass change of the Cu electrode. Explain from the reduction half-reaction.

12. Predict the concentration direction for Zn^{2+} in its half-cell.

13. Predict the concentration direction for Cu^{2+} in its half-cell.

14. Write the cell notation for the supplied model, left to right.

15. What does a single vertical line (|) represent in cell notation?

16. What does the double vertical line (||) represent in this classroom notation?

17. A student says, "The cathode is always negative." Correct the claim for this galvanic model and state the condition boundary.

18. A diagram arrow points from Cu to Zn through the wire. Correct the diagram using redox evidence.

19. Does cell notation alone prove a particular measurable voltage or reaction rate? Name one additional kind of evidence needed.

20. Write a cautious CER statement using one electron/ion-flow convention and one notation feature. Include a boundary on what the model establishes.
