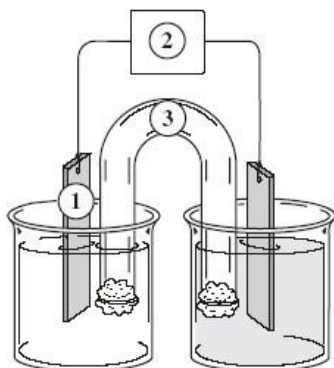


Practice - Electrochemical Cells

1. Consider the numbered components in the following diagram:



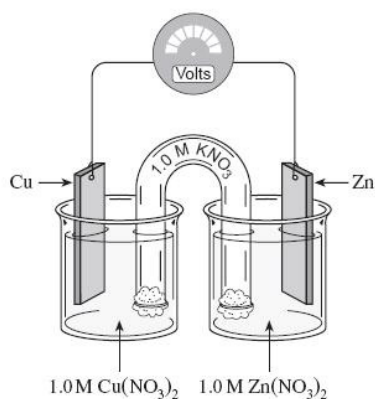
Which of the following would best describe the components of this electrochemical cell?

	<u>Component 1</u>	<u>Component 2</u>	<u>Component 3</u> (Contents)
A.	non-metal	power supply	NaNO_3 (aq)
B.	metal	light bulb	NaNO_3 (aq)
C.	metal	voltmeter	CH_3OH (aq)
D.	metal	power supply	CH_3OH (aq)

2. When MnO_2 changes to Mn_2O_3 in an alkaline battery, the manganese atoms

- | | |
|-----------------------------------|------------------------------------|
| A. lose electrons and are reduced | C. lose electrons and are oxidized |
| B. gain electrons and are reduced | D. gain electrons and are oxidized |

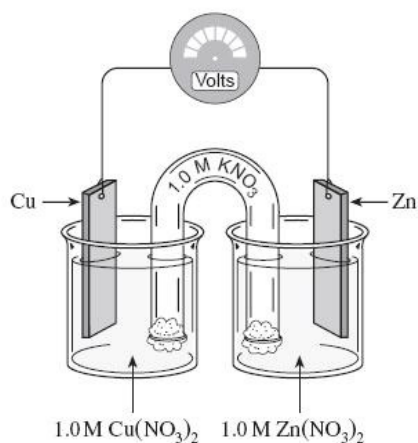
3. Consider the following cell:



The $[\text{Cu}^{+2}]$ in the copper half-cell will

- A. increase as Cu loses electrons and is reduced.
- B. increase as Cu loses electrons and is oxidized.
- C. decrease as Cu^{+2} gains electrons and is reduced.
- D. decrease as Cu^{+2} gains electrons and is oxidized.

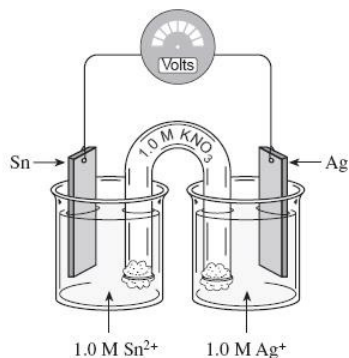
4. Consider the following cell:



The $[\text{Zn}^{+2}]$ in the zinc half-cell will

- A. increase as Zn loses electrons and is reduced.
- B. increase as Zn loses electrons and is oxidized.
- C. decrease as Zn^{+2} gains electrons and is reduced.
- D. decrease as Zn^{+2} gains electrons and is oxidized.

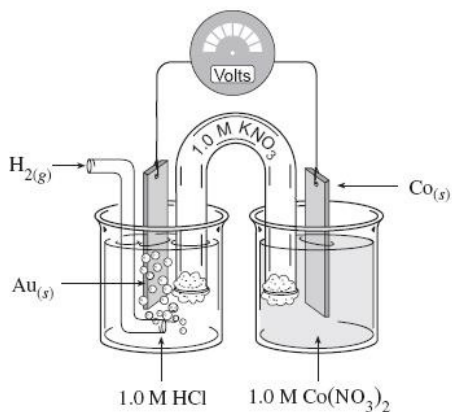
5. Consider the following cell:



What is the overall reaction:

- A. $2\text{Ag} + \text{Sn}^{2+} \rightarrow \text{Sn} + 2\text{Ag}^+$
- B. $2\text{Ag} + \text{Sn} \rightarrow \text{Sn}^{2+} + 2\text{Ag}^+$
- C. $2\text{Ag}^+ + \text{Sn}^{2+} \rightarrow \text{Sn}^{2+} + 2\text{Ag}^+$
- D. $2\text{Ag}^+ + \text{Sn} \rightarrow \text{Sn}^{2+} + 2\text{Ag}$

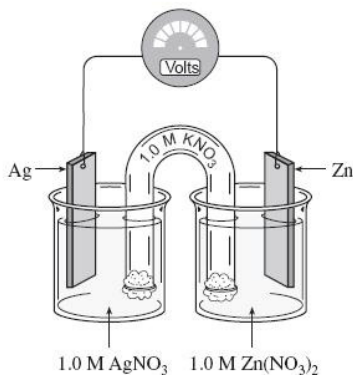
6. Consider the diagram below:



Identify the overall cell reaction

- A. $\text{Co}^{2+} + \text{H}_2 \rightarrow 2\text{H}^+ + \text{Co}$
- B. $2\text{Au}^{3+} + 3\text{Co} \rightarrow 2\text{Au} + 3\text{Co}^{2+}$
- C. $\text{Au}^{3+} + \text{Co}^{2+} \rightarrow \text{Au} + \text{Co}$
- D. $2\text{H}^+ + \text{Co} \rightarrow \text{Co}^{2+} + \text{H}_2$

7. Consider the following cell:



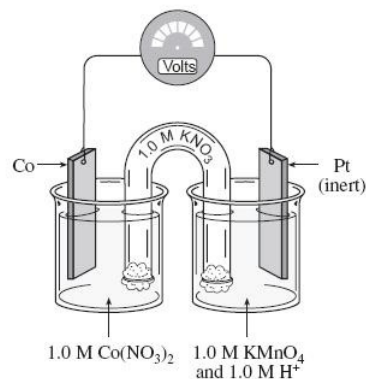
What is the equation for the half-reaction that occurs at the cathode?

- A. $\text{Ag} \rightarrow \text{Ag}^+ + e^-$
- B. $\text{Ag}^+ + e^- \rightarrow \text{Ag}$
- C. $\text{Zn} \rightarrow \text{Zn}^{2+} + 2e^-$
- D. $\text{Zn}^{2+} + 2e^- \rightarrow \text{Zn}$

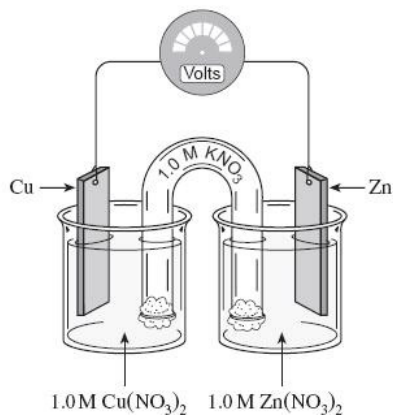
8. Consider the following cell:

Identify the anode reaction for the cell shown in the diagram.

- A. $\text{H}_2 \rightarrow 2\text{H}^+ + 2e^-$
- B. $\text{Co} \rightarrow \text{Co}^{2+} + 2e^-$
- C. $\text{Co}^{2+} + 2e^- \rightarrow \text{Co}$
- D. $\text{MnO}_4^- + 8\text{H}^+ + 5e^- \rightarrow \text{Mn}^{2+} + 4\text{H}_2\text{O}$



9. Consider the following cell:



In what directions do the electrons and cations move?

<u>Direction of Electrons</u>	<u>Direction of Cations</u>
A. towards the cathode	towards the anode
B. towards the cathode	towards the cathode
C. towards the anode	towards the anode
D. towards the anode	towards the cathode

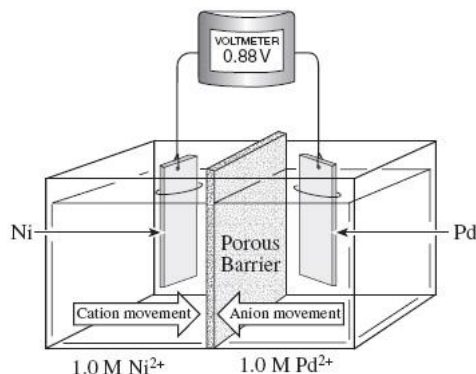
10. What is the function of the salt bridge in an electrochemical cell?

- A. It provides a path for electrons.
- B. It maintains electrical neutrality in each half cell.
- C. It allows the anode to become positively charged.
- D. It allows the cathode to become negatively charged.

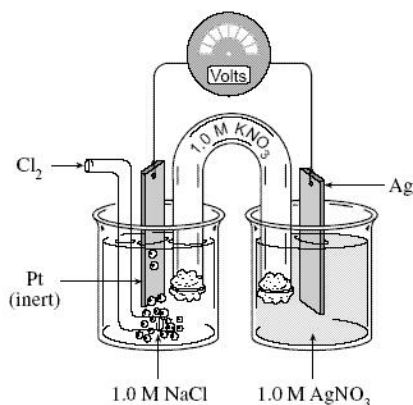
11. Consider the following diagram:

What is the half-cell reaction at the anode?

- A. $\text{Ni} \rightarrow \text{Ni}^{2+} + 2e^{-}$
- B. $\text{Pd} \rightarrow \text{Pd}^{2+} + 2e^{-}$
- C. $\text{Ni}^{2+} + 2e^{-} \rightarrow \text{Ni}$
- D. $\text{Pd}^{2+} + 2e^{-} \rightarrow \text{Pd}$



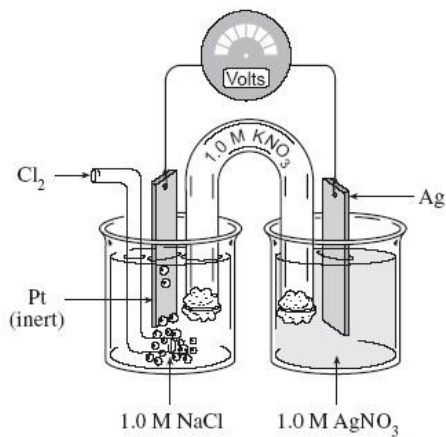
12. Consider the following cell:



Which of the following represents the anode half-cell reaction?

- A. $\text{Ag} \rightarrow \text{Ag}^{+} + e^{-}$
- B. $\text{Ag}^{+} + e^{-} \rightarrow \text{Ag}$
- C. $\text{Cl}_2 + 2e^{-} \rightarrow 2\text{Cl}^{-}$
- D. $2\text{Cl}^{-} \rightarrow \text{Cl}_2 + 2e^{-}$

13. Consider the following cell:



Which of the following represents the cathode half-cell reaction?

- A. $\text{Ag} \rightarrow \text{Ag}^+ + \text{e}^-$
- B. $\text{Ag}^+ + \text{e}^- \rightarrow \text{Ag}$
- C. $\text{Cl}_2 + 2\text{e}^- \rightarrow 2\text{Cl}^-$
- D. $2\text{Cl}^- \rightarrow \text{Cl}_2 + 2\text{e}^-$

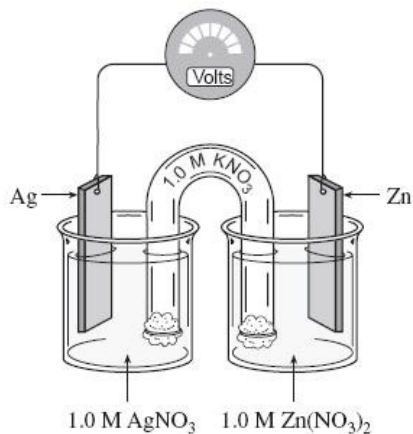
14. What is the function of the salt bridge in an electrochemical cell?

- A. It provides a path for electrons
- B. It maintains electrical neutrality in each half cell.
- C. It allows the anode to gain mass.
- D. It allows the cathode lose mass.

15. As a standard Zn/Ag electrochemical cell operates, in which direction do anions move and how does the mass of the cathode change?

- | <u>Anion direction</u> | <u>Mass of Cathode</u> |
|------------------------|------------------------|
| A. towards Zn | electrode increases |
| B. towards Ag | electrode increases |
| C. towards Zn | electrode decreases |
| D. towards Ag | electrode decreases |

16. Consider the following cell:



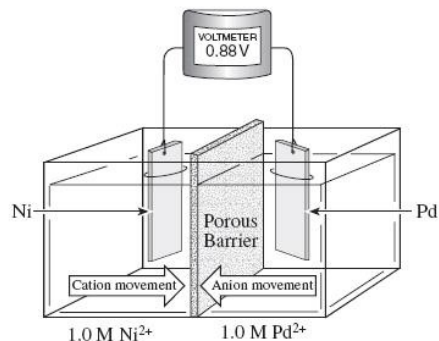
Which of the following is true about the flow of electrons and anions?

- | <u>Electrons flow towards</u> | <u>Anions move towards</u> |
|-------------------------------|----------------------------|
| A. Zn electrode | Zn electrode |
| B. Zn electrode | Ag electrode |
| C. Ag electrode | Ag electrode |
| D. Ag electrode | Zn electrode |

17. Consider the following diagram:

What best describes the flow of electrons?

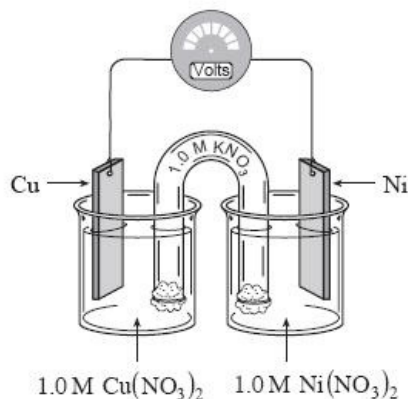
- A. from Ni to Pd
- B. from Pd to Ni
- C. from cathode to anode
- D. into the solution around the Ni electrode



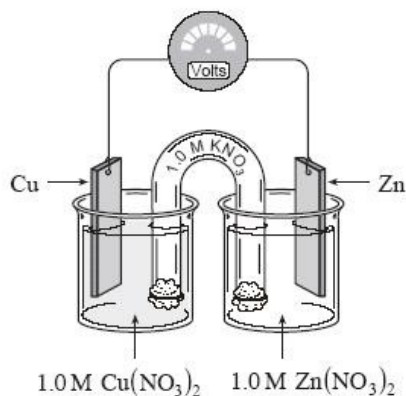
18. Consider the following cell:

What happens to the nickel electrode?

- A. It loses mass as it is reduced.
- B. It gains mass as it is reduced.
- C. It loses mass as it is oxidized.
- D. It gains mass as it is oxidized.



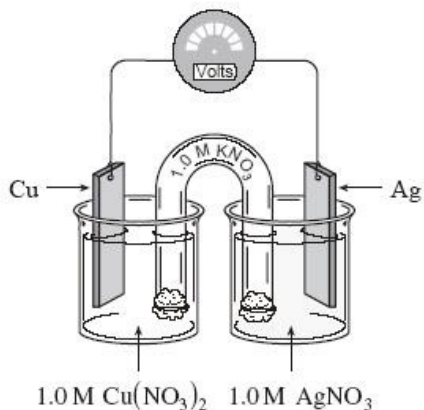
19. Consider the following cell:



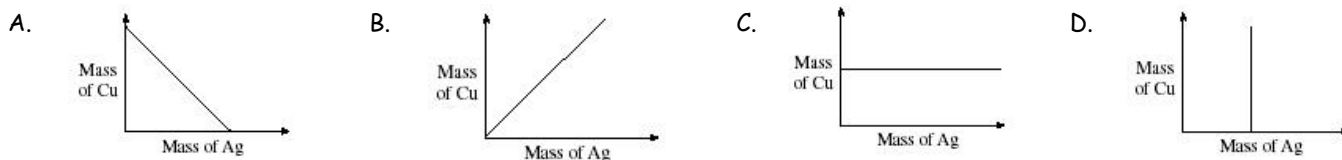
Which of the following represents the relationship between [NO₃⁻] and the mass of the Cu electrode in the copper half cell as it operates?

- A.
- B.
- C.
- D.

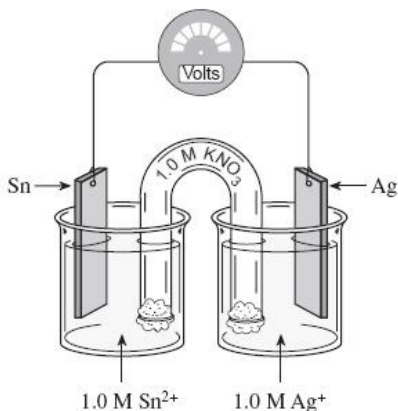
20. Consider the following cell:



Which of the following diagrams represents the relationship between the mass of the Cu electrode and the mass of the Ag electrode as the cell is in operation?



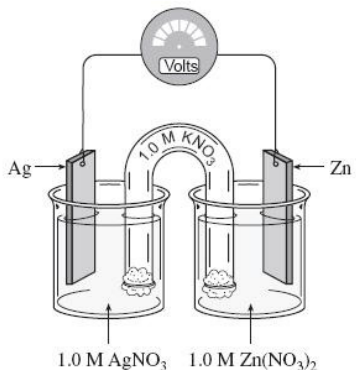
21. Consider the following cell:



In the cell, how do the mass of the anode and the $[Ag^+]$ change as the cell operates?

<u>Mass of anode</u>	<u>$[Ag^+]$</u>
A. decreases	increases
B. increases	increases
C. decreases	decreases
D. no change	decreases

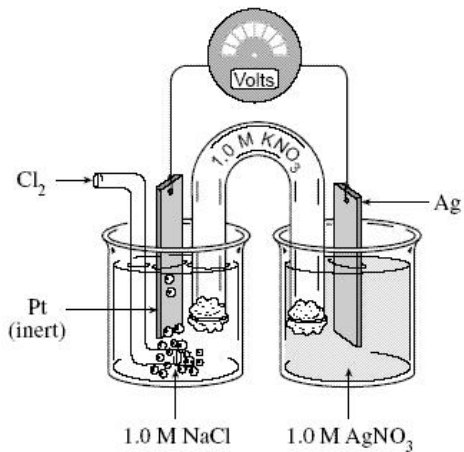
22. Consider the following cell:



What happens to the mass of each electrode as the cell operates?

<u>$Ag(s)$ electrode</u>	<u>$Zn(s)$ electrode</u>
A. increases	increases
B. decreases	decreases
C. increases	decreases
D. decreases	increases

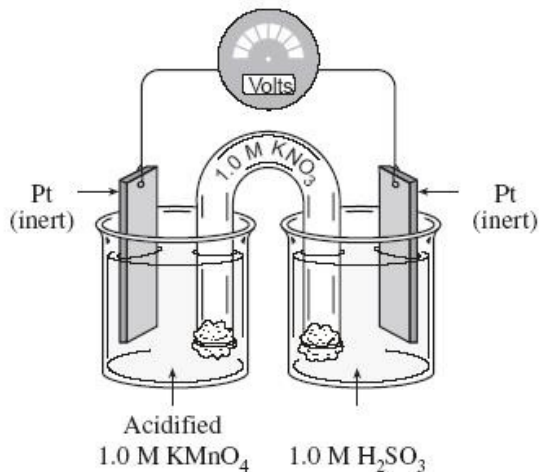
23. Consider the following electrochemical cell:



What changes in mass occur to the anode and cathode?

<u>Anode mass</u>	<u>Cathode mass</u>
A. decreases	increases
B. decreases	no change
C. increases	decreases
D. increases	no change

24. Consider the following:



Which of the following best describes what happens to the mass of the anode and the mass of the cathode as the cell operates?

<u>Anode Mass</u>	<u>Cathode Mass</u>
A. decreases	increases
B. decreases	stays constant
C. stays constant	decreases
D. stays constant	stays constant