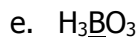
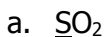


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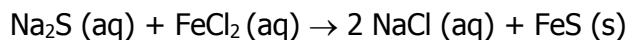
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AP Chemistry 30 L – Electrochemistry Review

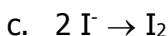
1. Determine the oxidation numbers of the underlined element in the following compounds:

2. Determine the oxidation number of each element in (NH₄)₂CO₃.

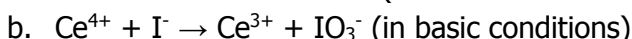
3. Is this a redox reaction? Explain why or why not.



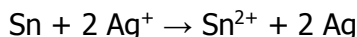
4. Balance each of the following half-reactions, then identify if it represents oxidation or reduction.



5. Balance each reaction using half-reactions.



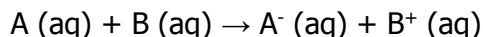
6. The net equation for a voltaic cell is:



a. Write the two half-reactions involved, and identify the anode and cathode.

b. Calculate the net potential of the cell in standard conditions.

7. For the generic reaction:

E^o_{cell} is a positive number.

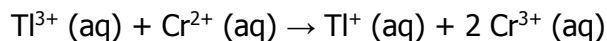
a. What is being oxidized, and what is being reduced?

b. If you made a galvanic cell out of this reaction, which half-reaction would be occurring at the cathode, and which would be occurring at the anode?

c. Which half-reaction would be higher in potential energy?

d. What is the sign of the free energy change for the reaction?

8. A voltaic cell uses the reaction:



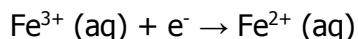
The cell has a measured standard cell potential of 1.19 V.

a. Write the two half-cell reactions.

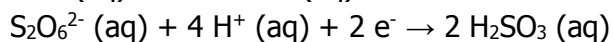
b. If the reduction potential for the oxidation half-reaction is -0.41 V, what is the reduction potential for the reduction half-reaction?

c. Sketch this cell. Label the anode, cathode and direction of electron flow.

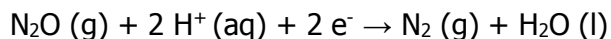
9. Given these half-reactions:



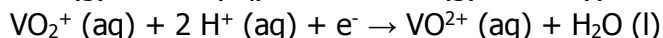
$$E^{\circ}_{\text{red}} = 0.77 \text{ V}$$



$$E^{\circ}_{\text{red}} = 0.60 \text{ V}$$



$$E^{\circ}_{\text{red}} = -1.77 \text{ V}$$



$$E^{\circ}_{\text{red}} = 1.00 \text{ V}$$

Name: _____

Date: _____

- a. Write balanced chemical equations for the oxidation of $\text{Fe}^{2+}(\text{aq})$ by $\text{S}_2\text{O}_6^{2-}(\text{aq})$, by $\text{N}_2\text{O}(\text{aq})$ and by $\text{VO}_2^+(\text{aq})$.
 - b. Calculate ΔG° for each reaction at 298K.
 - c. Calculate the equilibrium constant for each reaction at 298K.
10. What is the effect on the cell potential for a cell with the following overall reaction when each change is made?
- $$\text{Zn}(\text{s}) + 2 \text{H}^+(\text{aq}) \rightarrow \text{Zn}^{2+}(\text{aq}) + \text{H}_2(\text{g})$$
- a. The pressure of the hydrogen gas is increased in the cathode compartment
 - b. Zinc nitrate is added to the anode compartment
 - c. Sodium hydroxide is added to the cathode compartment
 - d. The surface area of the anode is doubled
11. a. A Cr^{3+} solution is electrolyzed using a current of 7.60 A. What mass of Cr (s) is plated out after 2.00 days?
- b. What amperage is required to plate out 0.250 mol Cr from a Cr^{3+} solution in a period of 8.00 h?