HW08 - REDOX and Electrochemical Cells
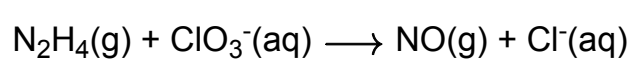
Question 1   4 pts

Balance the skeletal equation of hydrazine with chlorate ions, shown below:

$N_2H_4(g) + ClO_3^-(aq) \longrightarrow NO(g) + Cl^-(aq)$

The reaction takes place in basic solution. What is the smallest possible integer coefficient of ClO_3^- in the balanced equation?
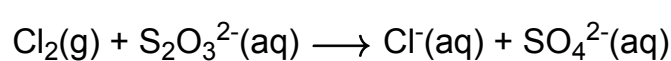
- ○ 4
- ○ 1
- ○ 2
- ○ 3

Question 2   3 pts

Identify the reducing agent in the reaction in question 1.

- ○ N_2H_4
- ○ NO
- ○ Cl^-
- ○ ClO_3^-

Question 3   3 pts

In the reaction of thiosulfate ion with chlorine gas in an acidic solution, what is the reducing agent?

$Cl_2(g) + S_2O_3^{2-}(aq) \longrightarrow Cl^-(aq) + SO_4^{2-}(aq)$

- ○ $S_2O_3^{2-}$
- ○ Cl_2
- ○ S^{2+}
- ○ Cl
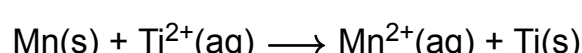
Question 4   4 pts

Balance the reaction in question 3 using oxidation and reduction half-reactions. What is the smallest possible integer coefficient of SO_4^{2-} in the combined balanced equation?

- ○ 2
- ○ 1
- ○ 3
- ○ 4

Question 5   4 pts

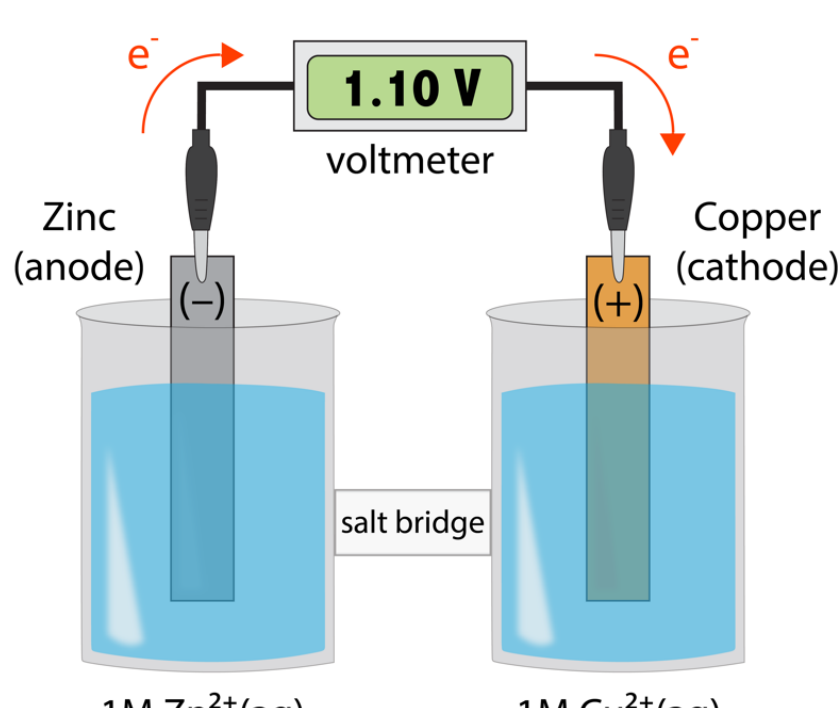Consider the cell reaction represented by the skeletal equation:

$Mn(s) + Ti^{2+}(aq) \longrightarrow Mn^{2+}(aq) + Ti(s)$

What is the proper cell diagram for this reaction?

- ○ $Mn(s) | Mn^{2+}(aq) || Ti^{2+}(aq) | Ti(s)$
- ○ $Mn^{2+}(aq) | Mn(s) || Ti(s) | Ti^{2+}(aq)$
- ○ $Ti(s) | Ti^{2+}(aq) || Mn^{2+}(aq) | Mn(s)$
- ○ $Ti^{2+}(aq) | Ti(s) || Mn(s) | Mn^{2+}(aq)$

Question 6   4 pts

In this electrochemical cell, what is the reduction half reaction?

- ○ $Cu^{2+}(aq) + 2e^- \longrightarrow Cu(s)$
- ○ $Zn(s) \longrightarrow Zn^{2+}(aq) + 2e^-$
- ○ $Cu(s) \longrightarrow Cu^{2+}(aq) + 2e^-$
- ○ $Zn^{2+}(aq) + 2e^- \longrightarrow Zn(s)$

Question 7   4 pts

In a galvanic cell...

- ○ oxidation and reduction take place at the same time, but at different electrodes
- ○ electrical energy is used to reverse spontaneous chemical reactions
- ○ electrolytes are added to carry electrons between electrodes
- ○ oxidation takes place at the cathode

Question 8   4 pts

In a working electrochemical cell (a galvanic cell or a battery), the cations in the salt bridge move toward the cathode.

- ○ True
- ○ False
- ○ It depends on the charge of the cation.
- ○ It is impossible to tell unless we know if the cathode is "+" or "-".