

**REDOX REACTONS**

## Chapter 17

1. In the compounds below, assign oxidation numbers to each element:

- a)  $\text{H}_3\text{PO}_2$       H = **+1**      P = **+1** O = **-2**
- b)  $\text{Na}_2\text{C}_2\text{O}_4$     Na = **+1**      C = **+3**      O = **-2**
- c)  $\text{MnSO}_4$       Mn = **+2**      S = **+6**      O = **-2**
- d)  $\text{H}_2\text{CO}$       H = **+1**      C = **0** O = **-2**
- e)  $\text{ClF}_4^-$       Cl = **+3**      F = **-1**

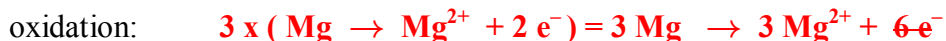
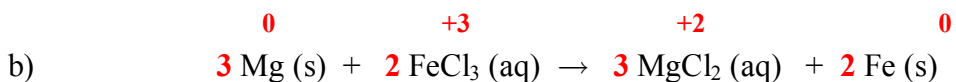
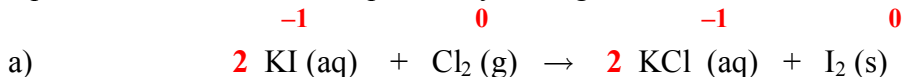
2. Determine if each reaction below is a redox reaction or not. Explain your choice.

- a)  $\overset{+5}{2}\text{KClO}_3 \rightarrow 2\overset{-1}{\text{KCl}} + 3\overset{0}{\text{O}_2}$       **Yes (Cl and O change oxidation numbers)**
- b)  $\overset{+6}{\text{SO}_3} + \overset{-2}{\text{H}_2\text{O}} \rightarrow \overset{+6}{\text{H}_2\text{SO}_4}$       **No (no elements change oxidation numbers)**
- c)  $\overset{+4}{2}\text{NO}_2 + \overset{-1}{\text{H}_2\text{O}_2} \rightarrow 2\overset{+5}{\text{HNO}_3}$       **Yes (N and O change oxidation numbers)**
- d)  $\overset{+1}{\text{KOH}} + \overset{-1}{\text{HI}} \rightarrow \overset{+1}{\text{KI}} + \overset{-2}{\text{H}_2\text{O}}$       **No (no elements change oxidation numbers)**

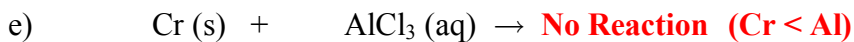
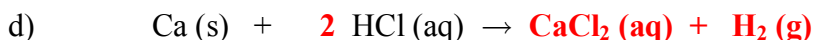
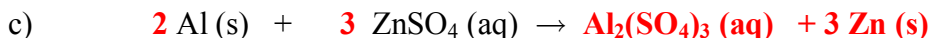
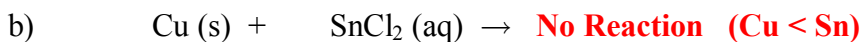
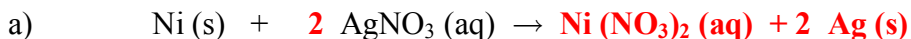
3. Identify which substance is oxidized and which substance is reduced in each of the following redox reactions.

- a)  $\overset{0}{2}\text{Al} + 3\overset{0}{\text{Cl}_2} \rightarrow 2\overset{+3}{\text{AlCl}_3}$   
 oxidizing agent  $\text{Cl}_2$  reducing agent  $\text{Al}$
- b)  $\overset{-2}{2}\text{NiS} + 3\overset{0}{\text{O}_2} \rightarrow 2\overset{-2}{\text{NiO}} + 2\overset{+4}{\text{SO}_2}$       oxidized  
 oxidizing agent  $\text{O}_2$  reducing agent  $\text{NiS}$
- c)  $\overset{-2}{3}\text{H}_2\text{S} + 2\overset{+5}{\text{HNO}_3} \rightarrow 3\overset{0}{\text{S}} + 2\overset{+2}{\text{NO}} + 4\overset{0}{\text{H}_2\text{O}}$   
 oxidizing agent  $\text{HNO}_3$  reducing agent  $\text{H}_2\text{S}$
- d)  $\overset{-3}{8}\text{NH}_3 + 6\overset{+4}{\text{NO}_2} \rightarrow 7\overset{0}{\text{N}_2} + 12\overset{0}{\text{H}_2\text{O}}$   
 oxidizing agent  $\text{NO}_2$  reducing agent  $\text{NH}_3$

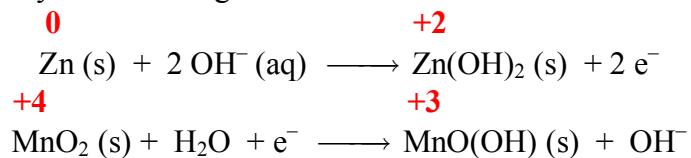
4. Write oxidation and reduction half-reactions for each of the following redox equations and balance the equation by adding the half-reactions.



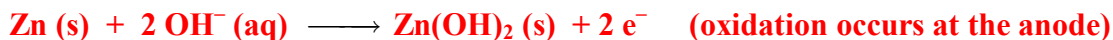
5. Use the activity series to complete and balance each reaction below. If no reaction occurs, write "No Reaction" after the arrow.



6. In an alkaline battery the following reactions occur:



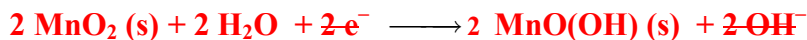
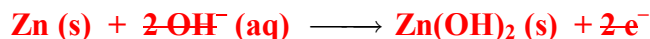
a) Which reaction occurs at the anode?



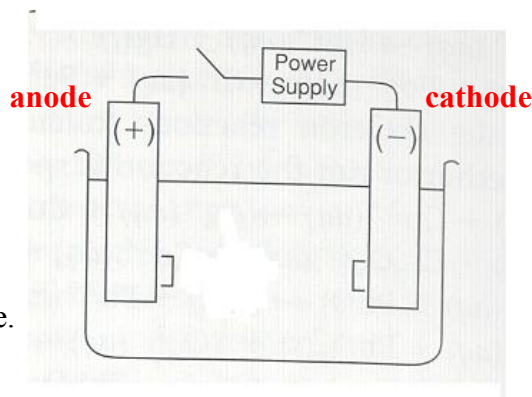
b) Which reaction occurs at the cathode?



c) Write the balanced overall reaction.



7. An electrolytic cell, similar to one shown below, is used to decompose CaO.



a) Identify the cathode and the anode.

**See diagram**

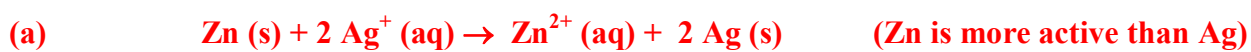
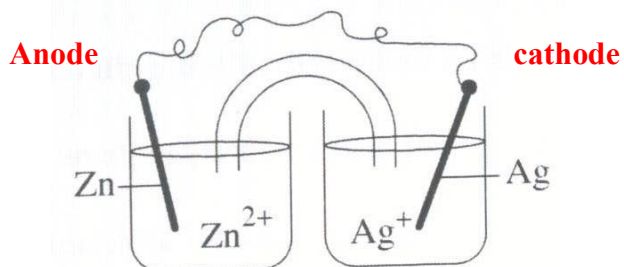
b) Write half-reactions for each electrode.



c) Write overall reaction for the electrolysis.



8. In the voltaic cell shown below, (a) write the overall reaction, (b) identify the anode and cathode, and (c) write half-reaction for each electrode.



b) See diagram above

