20 • Electrochemistry

20.1 – 20.2 REDOX Reactions and Balancing HR

Quick Refresher: Write the oxidation States for the following compounds/ions

H_3O^+	$C_2O_4^{2-}$
CO_3^{2-}	ClO^-
NO_3^-	LiF

REDOX in Reactions: determine which is oxidized/reduced

For example, the following is used in a nickel-cadmium rechargeable battery

$$Cd_{(s)} + NiO_{2(s)} + 2H_2O_{(l)} \rightarrow Cd(OH)_{2(s)} + Ni(OH)_{2(s)}$$

The reducing agent is _____

The oxidizing agent is _____

Which one get's reduced? _____

Which one get's oxidized? _____

Balancing REDOX Equations – 4 Step Process

- Write the Reduction and Oxidation Equations (if not already written for you)
  - New Step; Include subscripts for bimolecular elements only Ex: I_2, F_2, N_2
- Balance the Half – Reactions
- Add them together and write the final equation
- Check to verify conservation of mass and charge

Directions: Balance the following Half-Reactions (already in Half-Reaction format)

1. $I_2(s) \rightarrow I^-(aq)$ _____

2. $Ca(s) \rightarrow Ca^{2+}(aq)$ _____

3. $Al(s) \rightarrow Al^{3+}(aq)$ _____

4. $S_8(s) \rightarrow S^{2-}(aq)$ _____

5. $N_2(g) \rightarrow N^{3-}(s)$ _____

6. $Cl_2(g) \rightarrow Cl^-(g)$ _____

Directions: Write the balanced Half-Reactions and final equation for the following:

1. $Fe(s) + O_2(g) \rightarrow Fe_2O_3(s)$

Balanced Oxidation Reaction: _____

Balanced Reduction Reaction: _____

Added Equation: _____

Final Equation: _____

2. $Al(s) + Cl_2(g) \rightarrow AlCl_3(s)$

Balanced Oxidation Reaction: _____

Balanced Reduction Reaction: _____

Added Equation: _____

Final Equation: _____

2. $Mg(s) + P_4(s) \rightarrow Mg_3P_2(s)$

Balanced Oxidation Reaction: _____

Balanced Reduction Reaction: _____

Added Equation: _____

Final Equation: _____

3. $SnO_2(s) + C(s) \rightarrow Sn(s) + CO(g)$

Balanced Oxidation Reaction: _____

Balanced Reduction Reaction: _____

Added Equation: _____

Final Equation: _____

4. $4K(s) + O_2(g) \rightarrow 2K_2O(s)$

Balanced Oxidation Reaction: _____

Balanced Reduction Reaction: _____

Added Equation: _____

Final Equation: _____

5. $4Ag(s) + O_2(g) \rightarrow 2Ag_2O(s)$

Balanced Oxidation Reaction: _____

Balanced Reduction Reaction: _____

Added Equation: _____

Final Equation: _____

6. $NH_3 + O_2 \rightarrow NO + H_2O$

Balanced Oxidation Reaction: _____

Balanced Reduction Reaction: _____

Added Equation: _____

Final Equation: _____

7. $Ca(s) + Cu(NO_3)_2 \rightarrow Ca(NO_3)_2 + Cu$

Balanced Oxidation Reaction: _____

Balanced Reduction Reaction: _____

Added Equation: _____

Final Equation: _____