Worksheet #1

Writing half reactions

1.	. Define each: Remember "Oil Rig": Oxidation is loss (of e-)reduction is gain (of e	
	a)	Oxidation
	b)	Reduction
	c)	Oxidizing agent
	d)	Reducing agent
2.	Write half reactions for each of the following atoms or ions. Label each as oxidation or reduction. Use the Activity Series Chart. a) Al	
	•	Ba^{2+}
	c)	Br_2
	d)	Ca Ca
	e)	Ga^{3+}
	f)	H_2
	g)	H^{+}

- 3. Balance the spontaneous redox reaction below. A spontaneous reaction is a reaction that occurs: 1) by a driving force that favors the product, 2) the free energy of the product is lower than the free energy of the reactant, and/or 3) occurs without any outside 'help' such as electrolysis. Identify the entities reduced and oxidized. State the reducing agent and the oxidizing agent.
 - a) $Al+Zn^{2+}$
 - b) $F_2 + O^{2-}$
 - c) O₂ +Ca
 - d) $Al^{3+} + Li$
- 4. Write the oxidation and reduction reactions for each redox reaction. The first one is done for you.
 - a) $Fe^{2+}_{(aq)} + Co_{(s)} \rightarrow Co^{2+}_{(aq)} + Fe_{(s)}$
 - (i) Oxidation: $Co_{(s)} \rightarrow Co^{2+}_{(aq)} + 2e^{-1}$
 - (ii) Reduction: $Fe^{2+}_{(aq)} + 2e^{-} \rightarrow Fe_{(s)}$
 - b) $Ag^{+}_{(aq)} + Ni_{(s)} \rightarrow Ni^{3+}_{(aq)} + 3 Ag_{(s)}$
 - (i) Oxidation:
 - (ii) Reduction:
 - c) $Cu^{2+}_{(aq)} + Pb_{(s)} \rightarrow Cu^{2+}_{(aq)} + Pb_{(s)}$
 - (i) Oxidation:
 - (ii) Reduction:
 - d) $Sn_{(s)} + O_{2(g)} \rightarrow O^{2-} + 2Sn^{2+}_{(aq)}$
 - (i) Oxidation:
 - (ii) Reduction:
 - e) $Co^{2+}_{(aq)} + 2 F^{-}_{(aq)} \rightarrow Co_{(s)} + F_{2(g)}$
 - i) Oxidation:
 - ii) Reduction:

Redox Half Reactions and Reactions WS #1

Define each

(g) Oxidation - loss of electrons (g) Reduction - gain of electrons

© Oxidizing agent - causes oxidation by undergoing reduction - causes reduction by undergoing oxidation

Write half reactions for each of the following atoms or ions. Label each as oxidation or reduction.

1. Al
$$\rightarrow$$
 Al³ + 3e⁻ oxidation

2.
$$Ba^{2+} + 2e^{-} \rightarrow Ba$$
 reduction

3. Ca
$$\rightarrow$$
 Ca²⁺ + 2e⁻ oxidation

4.
$$Ga^{3+}$$
 + 3e \rightarrow Ga reduction

5.
$$H_2 \rightarrow 2H^+ + 2e^-$$
 oxidation

6.
$$2H^+ + 2e \rightarrow H_2$$
 reduction

Balance each spontaneous redox equation. Identify the entities reduced and oxidized. State the reducing agent and the oxidizing agent.

i.
$$2Al + 3Zn^{2+} \rightarrow 2Al^{3+} + 3Zn$$
 ii. oxidized reduced

i.
$$2F_2$$
 + $2O^{2-} \rightarrow 4F^{-} + O_2$

i.
$$2Ca + O_2 \rightarrow 2Ca^{2+} + 2O^{2-}$$
ii. oxidized reduced
iii. reducing agent oxidizing agent

 Al^{3+} + 3Li \rightarrow Al + $3Li^{+}$ reduced oxidized oxidizing agent reducing agent

Label the species that is reduced, that is oxidized, the reducing agent and the oxidizing agent.

- 1. Fe^{2+} + Co \rightarrow Co^{2+} + Fe
 - Co \rightarrow Co²⁺ + 2e⁻ oxidation Fe²⁺ + 2e- \rightarrow Fe reduction
- 2. 3 Ag^+ + Ni \rightarrow Ni³⁺ + 3 Ag
 - Ni \rightarrow Ni²⁺ + 2e⁻ oxidation Ag⁺ + 1e- \rightarrow Agreduction
- 3. Cu^{2+} + Pb \rightarrow Pb²⁺ + Cu
 - Pb \rightarrow Pb²⁺ + 2e⁻ oxidation Cu²⁺ + 2e- \rightarrow Cureduction
- 4. O_2 + 2 Sn \rightarrow O^{2-} + 2 Sn²⁺
 - Sn \rightarrow Sn²⁺ + 2e⁻ oxidation O₂ + 4e- \rightarrow 2O²⁻

reduction