This homework is due on Thursday, April 28, at class time. This assignment will be NOT BE ACCEPTED LATE FOR CREDIT.

1. (10 points) Each of the following is a partial reaction – not fully balanced but showing enough to answer the question. In each case, identify whether the species is being oxidized or reduced and state the method you used to arrive at your answer – gain of oxygen, loss of hydrogen, or loss of electrons.

   a. Al^{3+} \rightarrow \text{Al}  
     \text{Species oxidized or reduced?}  \quad \text{REDUCED}  
     \text{Method used to decide?}  \quad \text{ELECTRON OR HYDROGEN}

   b. H_2 \rightarrow 2 \text{H}^+  
     \text{Species oxidized or reduced?}  \quad \text{OXIDIZED}  

   c. C_{12}H_{26} \rightarrow C_{12}H_{24}  
     \text{Species oxidized or reduced?}  \quad \text{OXIDIZED}  

   d. C_6H_{12}O_2 \rightarrow C_6H_{12}O  
     \text{Species oxidized or reduced?}  \quad \text{REDUCED}  

   e. Hg_2^{2+} \rightarrow 2 \text{Hg}  
     \text{Species oxidized or reduced?}  \quad \text{REDUCED}  

2. (5 points) Identify the oxidizing agent in each of the following reactions:

   a. C + H_2O \rightarrow CO + H_2 
     \text{Oxidizing Agent} 
     \text{H}_2\text{O} \quad \text{(IS REDUCED - GAINS N)} 

   b. Zr + 2 H_2O \rightarrow ZrO_2 + 2 H_2 
     \text{Oxidizing Agent} 
     \text{H}_2\text{O} \quad \text{(SAME AS A - I WASN'T THINKING)} 

   c. Fe + 2H_2 \rightarrow Fe^{2+} + H_2 
     \text{Oxidizing Agent} 
     \text{H}_2\text{O} \quad \text{(HYDROGEN)} 

   d. H_2SO_4 + Zn \rightarrow ZnSO_4 + H_2 
     \text{Oxidizing Agent} 
     \text{H}_2\text{SO}_4 \quad \text{(HYDROGEN)} 

   e. 2 \text{C}_8\text{H}_{18} + 25 \text{O}_2 \rightarrow 16 \text{CO}_2 + 18 \text{H}_2\text{O} 
     \text{Oxidizing Agent} 
     \text{O}_2 \quad \text{(HYDROGEN)} 

3. (5 points) Label each of the following half-reactions as either an oxidation or reduction. Then combine them to obtain an overall balanced redox equation.

   a. Br_2(l) + 2 e^- \rightarrow 2 Br^- (aq)  
     \text{Oxidation or reduction?} 
     \text{REDUCTION} 

   \text{Cu (s)} \rightarrow \text{Cu}^{2+} (aq) + 2 e^-  

   \text{Overall balanced equation:} \quad \text{Br}_2(l) + \text{Cu (s)} \rightarrow 2 \text{Br}^-(aq) + \text{Cu}^{2+}(aq) 

   b. \left(\text{Cl}_2(g) + 2 e^- \rightarrow 2 \text{Cl}^-(aq)\right) \times 3  
     \text{Oxidation or reduction?} 
     \text{REDUCTION} 

   \left(\text{Al (s)} \rightarrow \text{Al}^{3+} (aq) + 3 e^-\right) \times 2  

   \text{Overall balanced equation:} \quad 3\text{Cl}_2(g) + 2 \text{Al (s)} \rightarrow 6 \text{Cl}^-(aq) + 2 \text{Al}^{3+}(aq)