

A. Balance and complete each of the following reactions. Name the products formed.

1.  $\text{Na(s)} + \text{H}_2\text{O} \rightarrow$
2.  $\text{K(s)} + \text{H}_2\text{O} \rightarrow$
3.  $\text{Ca(s)} + \text{H}_2\text{O} \rightarrow$
4.  $\text{Mg(s)} + \text{H}_2\text{O} \rightarrow$
5.  $\text{Al(s)} + \text{H}_2\text{O} \rightarrow$
6.  $\text{Cs(s)} + \text{H}_2\text{O} \rightarrow$
7.  $\text{Cu(s)} + \text{H}_2\text{O} \rightarrow$
8.  $\text{Zn(s)} + \text{H}_2\text{O} \rightarrow$
9.  $\text{Mg(s)} + \text{H}_2\text{O(STEAM)} \rightarrow$
10.  $\text{Zn(s)} + \text{HCl(aq)} \rightarrow$
11.  $\text{Mg(s)} + \text{HCl(aq)} \rightarrow$
12.  $\text{Cu(s)} + \text{HCl(aq)} \rightarrow$
13.  $\text{Ag(s)} + \text{H}_2\text{SO}_4\text{(aq)} \rightarrow$
14.  $\text{Ca(s)} + \text{H}_2\text{SO}_4\text{(aq)} \rightarrow$
15.  $\text{Al(s)} + \text{HCl(aq)} \rightarrow$
16.  $\text{Pt(s)} + \text{H}_2\text{SO}_4\text{(aq)} \rightarrow$
17.  $\text{Fe(s)} + \text{CuSO}_4\text{(aq)} \rightarrow$
18.  $\text{Cu(s)} + \text{FeSO}_4\text{(aq)} \rightarrow$
19.  $\text{Zn(s)} + \text{CuSO}_4\text{(aq)} \rightarrow$
20.  $\text{Cu(s)} + \text{ZnSO}_4\text{(aq)} \rightarrow$

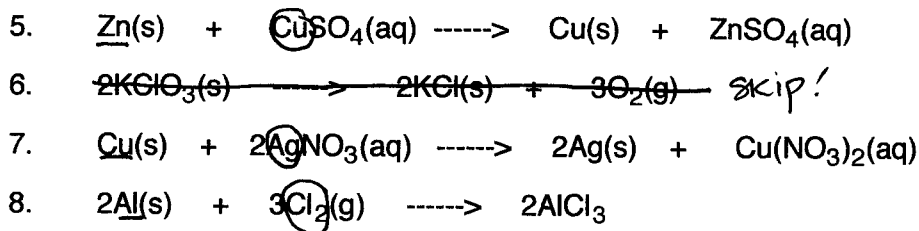
see following  
pages,

assume : "H<sub>2</sub>O" is  
room temperature  
water

B. In each of the following, underline the substance oxidized (reducing agent) and circle the substance reduced (oxidizing agent).

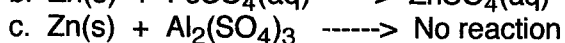
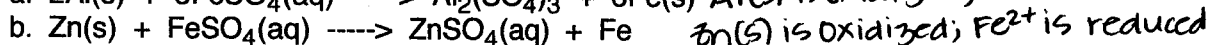
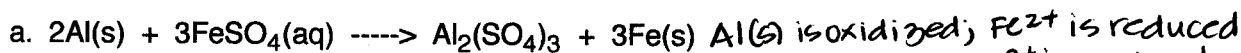
1. Zn(s) + 2HCl(aq)  $\rightarrow$  H<sub>2</sub>(g) + ZnCl<sub>2</sub>(aq)
2. 2Mg(s) + O<sub>2</sub>(g)  $\rightarrow$  2MgO(s)
3. Cl<sub>2</sub>(g) + 2KI(aq)  $\rightarrow$  I<sub>2</sub>(s) + 2KCl(aq)
4. S<sub>2</sub>O<sub>2</sub>(g) + O<sub>2</sub>(g)  $\rightarrow$  2SO<sub>3</sub>(g)

What ever is oxidized  
or reduced is  
always on the reactants  
side of the equation  
(left side of " $\rightarrow$ ")

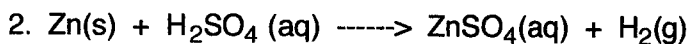


C. More redox problems.

1. From the following reactions, select the strongest reducing agent Al and the weakest reducing agent Fe<sup>2+</sup>.



means that the reverse reaction goes:  $2\text{Al}(\text{s}) + 3\text{ZnSO}_4(\text{aq}) \rightarrow 3\text{Zn}(\text{s}) + \text{Al}_2(\text{SO}_4)_3(\text{s})$   
 Al(s) is oxidized; Zn<sup>2+</sup> is reduced



In the above equation (2), the substance oxidized is Zn(s), the substance reduced is

H<sup>+</sup>, and the substance that is the reducing agent is Zn(s)

D. Some Practice Quiz Problems.

(You will also be given "Complete and Balance" problems similar to Part A of this Activity Sheet)

1. Which of the following will react with cold water?

- a. Na<sup>+</sup> ion    b. Ba<sup>2+</sup> ion    c. Zn    **d. Li**    e. Ag

← very active metal

2. In oxidation-reduction reactions, the substance reduced:

- a. loses electrons    **d. gains electrons**  
 b. always combines with oxygen    e. none of these  
 c. has a higher oxidation state

(definition of reduction)

3. Which of the following will not react with HCl?

- a. Cu**    b. Zn    c. Fe    d. Al    e. Mg

4. When sodium metal is placed in distilled water, the products are

- a. Na<sub>2</sub>O + H<sub>2</sub>    d. NaH + H<sub>2</sub>O  
 b. NaOH + H<sub>2</sub>O    e. no reaction  
**c. NaOH + H<sub>2</sub>**

← did in lab + lecture

5. When aluminum metal is added to sulfuric acid, the products are

- a. Al<sub>2</sub>S<sub>3</sub> + H<sub>2</sub>O    d. Al<sub>2</sub>O<sub>3</sub> + H<sub>2</sub>S  
**b. Al<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub> + H<sub>2</sub>**    e. no reaction  
 c. AlSO<sub>4</sub> + H<sub>2</sub>



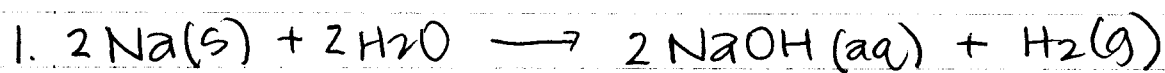
∴ need 2 Al<sup>3+</sup> + 3 SO<sub>4</sub><sup>-2</sup>  
 ∴ Al<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub>

6. In the reaction,  $\text{Zn}(\text{s}) + 2\text{AgNO}_3(\text{aq}) \rightarrow \text{Zn}(\text{NO}_3)_2(\text{aq}) + 2\text{Ag}(\text{s})$ , which statement is true?

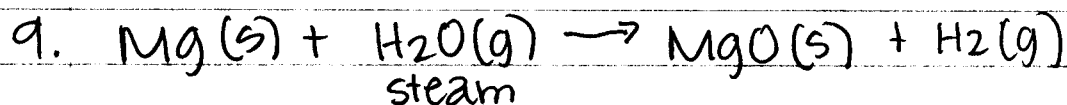
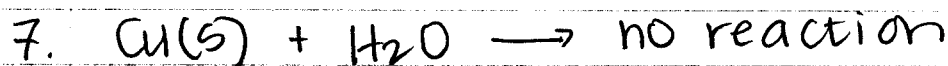
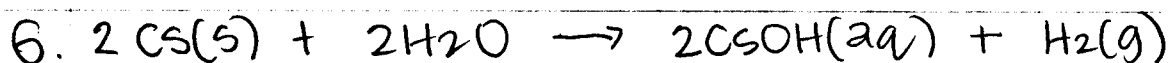
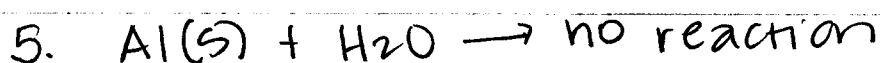
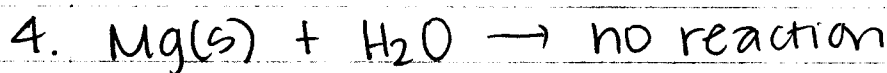
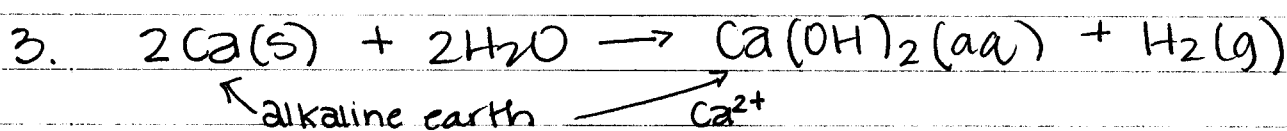
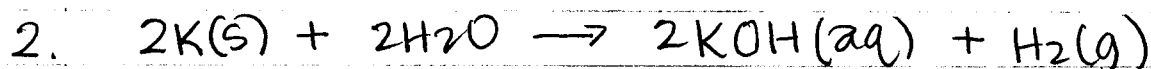
- a. Ag<sup>+</sup> is oxidized. (lose e<sup>-</sup>) → NO  
 b. Zn is reduced. (Zn<sup>-2</sup> / no)  
**c. Ag<sup>+</sup> is reduced.**  
 d. NO<sub>3</sub><sup>-1</sup> is oxidized. (same on both sides)  
 e. no reaction would occur

KNOW YOUR redox definitions & how to apply them!

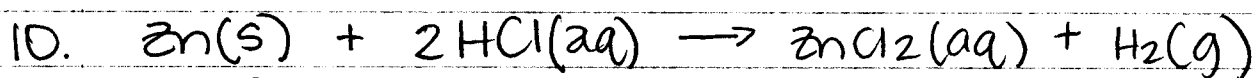
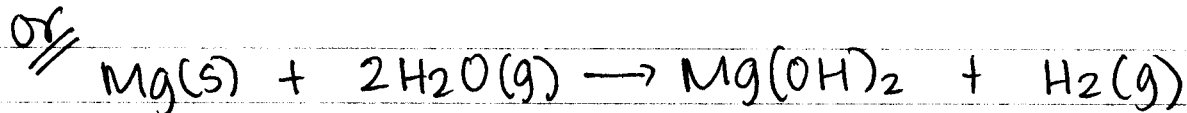
no! you have a moderately active metal being oxidized and a "1" metal being reduced → this reaction goes!

Part A

very active metal (alkali) +  $\text{H}_2\text{O} \rightarrow$  base  $\rightarrow \text{OH}^-$  +  $\text{H}_2(g)$

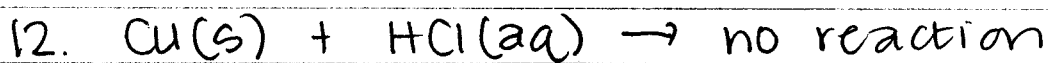
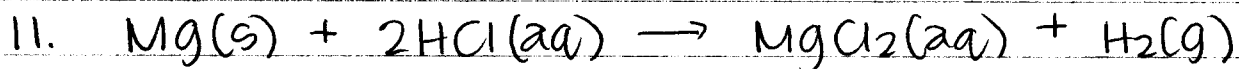


or

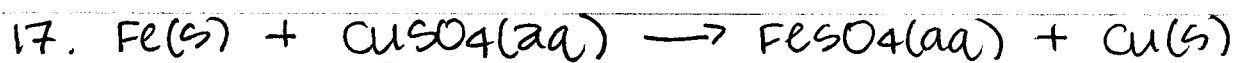
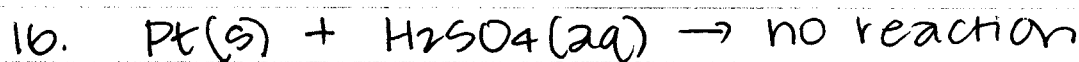
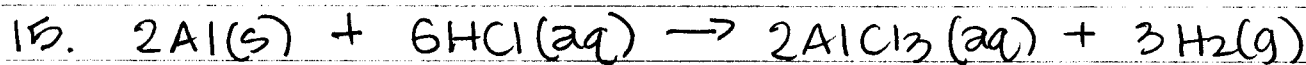
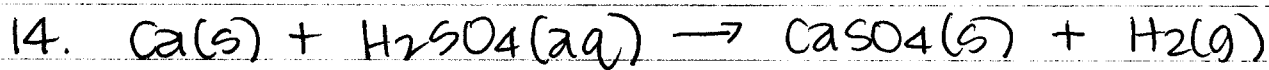
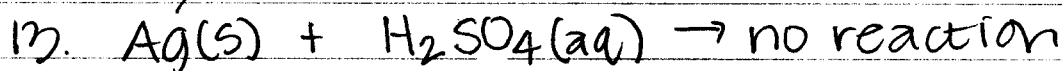


↑  
moderately active metal

↑  
 $\text{Zn}^{2+}$  ion

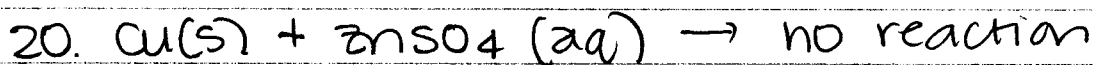
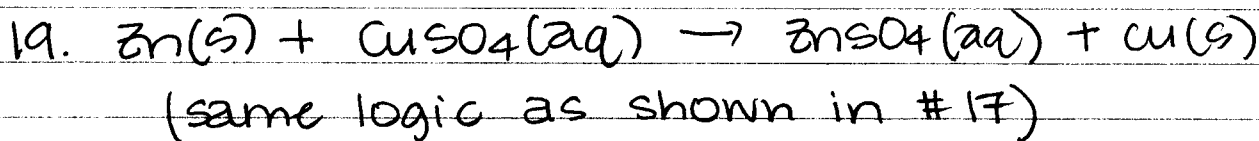
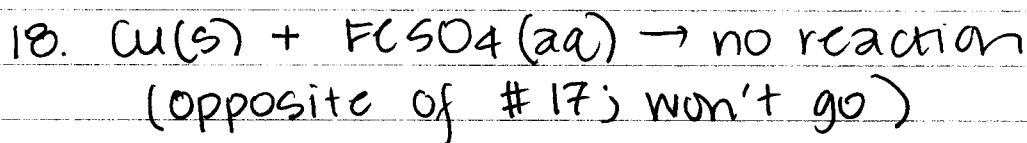
Part A (continued)

↳ "I" metals do not react with acid



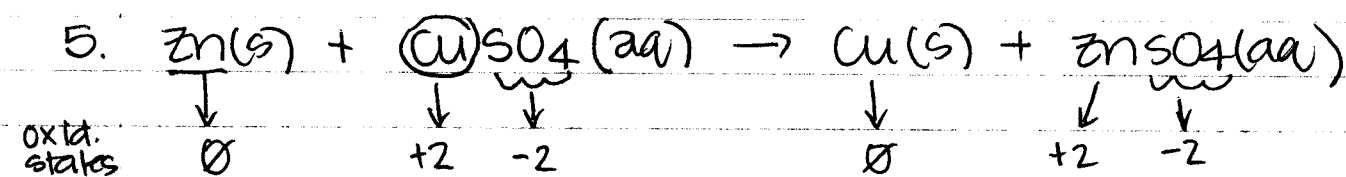
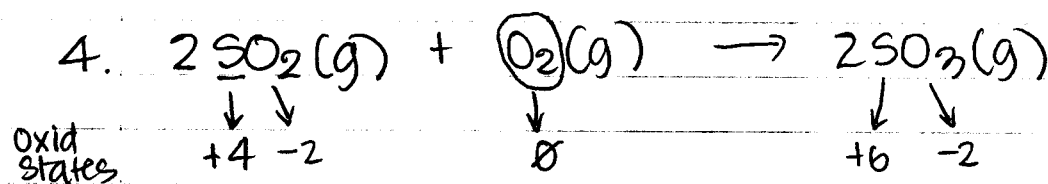
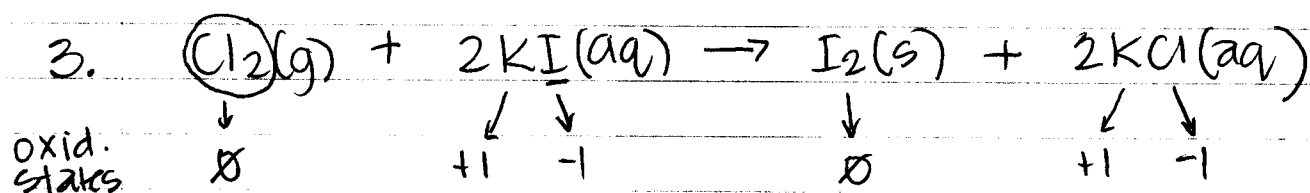
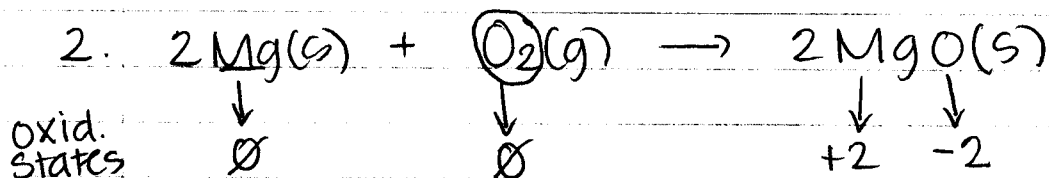
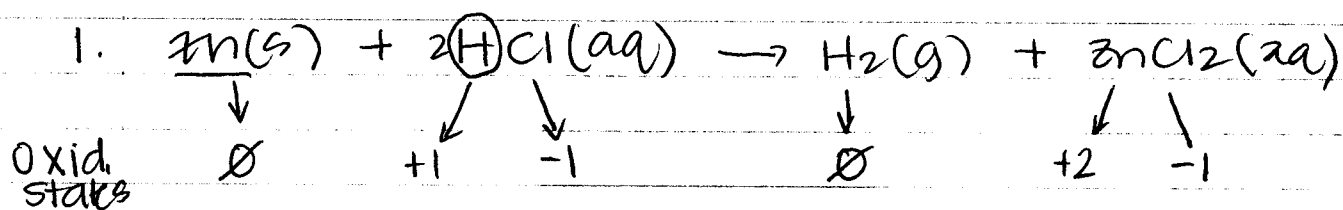
↑  
moderately  
active;  
oxidized

↳  $\text{Cu}^{2+}$  "I"  
metal; rather  
be reduced



Part B

"—" oxidized; "O" reduced



6. skip!

