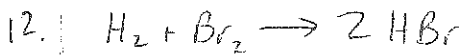


## Math of Chem Review

- a)  $\text{NH}_3$  17.0 g/mol      b)  $\text{Al}_2(\text{SO}_4)_3$  294.3 g/mol
- $50.5 \text{ g Al}_2\text{O}_3 \times \frac{1 \text{ mol Al}_2\text{O}_3}{102.0 \text{ g Al}_2\text{O}_3} = 0.495 \text{ mol Al}_2\text{O}_3$
- $0.680 \text{ mol Xe} \times \frac{6.02 \times 10^{23} \text{ molecules}}{1 \text{ mol Xe}} = 4.09 \times 10^{23} \text{ molecules}$
- $3.00 \times 10^{24} \text{ molecules C}_2\text{H}_6 \times \frac{1 \text{ mol}}{6.02 \times 10^{23} \text{ molecules}} \times \frac{30.0 \text{ g}}{1 \text{ mol}} = 150. \text{ g C}_2\text{H}_6$
- $\% \text{O} = \frac{48.0 \text{ g O}}{100.1 \text{ g CaCO}_3} \times 100 = 48.0 \%$
- $\% \text{H}_2\text{O} = \frac{18.0 \text{ g H}_2\text{O}}{322.1 \text{ g CaSO}_4 \cdot 10\text{H}_2\text{O}} = 5.59 \%$
- $42.1 \text{ g Cl} \times \frac{1 \text{ mol}}{35.5 \text{ g}} = 1.19 \text{ mol Cl} / 0.297 = 4$        $\text{PtCl}_4$   
 $57.8 \text{ g Pt} \times \frac{1 \text{ mol}}{195.1 \text{ g}} = 0.296 \text{ mol} / 0.297 = 1$
- $75.8 \text{ g As} \times \frac{1 \text{ mol}}{74.9 \text{ g}} = 1.01 \text{ mol As}$   
 $21.2 \text{ g O} \times \frac{1 \text{ mol}}{16.0 \text{ g}} = 1.33 \text{ mol O}$       } double both       $\text{As}_2\text{O}_3$
- $80.0 \text{ g C} \times \frac{1 \text{ mol C}}{12.0 \text{ g C}} = 6.67 \text{ mol C} / 6.67 = 1 \text{ mol C}$   
 $20.0 \text{ g H} \times \frac{1 \text{ mol H}}{1.0 \text{ g H}} = 20.0 \text{ mol H} / 6.67 = 3 \text{ mol H}$        $\frac{30}{15} = 2$   
 $\text{CH}_3 = \text{emp. form}$   
 $\text{C}_2\text{H}_6 = \text{molec. form}$
- $2\text{Na} + 2\text{H}_2\text{O} \rightarrow 2\text{NaOH} + \text{H}_2$ 
  - $0.500 \text{ mol Na} \times \frac{1 \text{ mol H}_2}{2 \text{ mol Na}} = 0.250 \text{ mol H}_2$
  - $40.0 \text{ g H}_2\text{O} \times \frac{1 \text{ mol H}_2\text{O}}{18.0 \text{ g H}_2\text{O}} \times \frac{2 \text{ mol NaOH}}{2 \text{ mol H}_2\text{O}} \times \frac{40.0 \text{ g NaOH}}{1 \text{ mol NaOH}} = 88.9 \text{ g NaOH}$
- $4\text{Al} + 3\text{O}_2 \rightarrow 2\text{Al}_2\text{O}_3$ 
  - $4.0 \text{ mol Al} \times \frac{3 \text{ mol O}_2}{4 \text{ mol Al}} = 3.0 \text{ mol O}_2 \text{ needed. } \text{Al is limiting}$
  - $4.0 \text{ mol Al} \times \frac{2 \text{ mol Al}_2\text{O}_3}{4 \text{ mol Al}} = 2.0 \text{ mol Al}_2\text{O}_3$

28  
80  
108

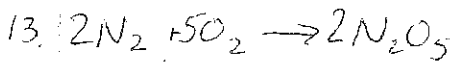
105



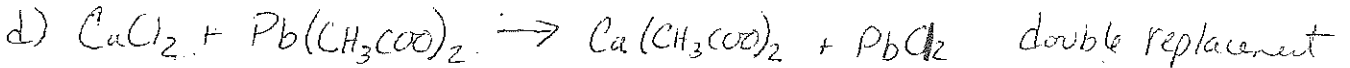
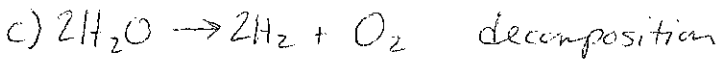
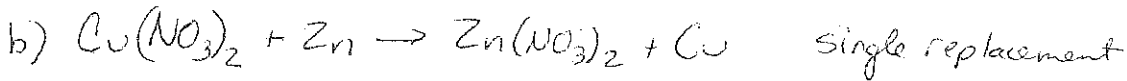
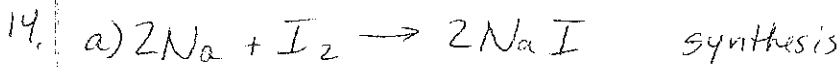
a)  $20.0 g H_2 \times \frac{1 mol H_2}{2.0 g H_2} \times \frac{1 mol Br_2}{1 mol H_2} \times \frac{159.8 g Br_2}{1 mol Br_2} = 159.8 g \text{ of } Br_2 \text{ needed}$   
*Br<sub>2</sub> is limiting*

b)  $50.0 g Br_2 \times \frac{1 mol Br_2}{159.8 g Br_2} \times \frac{1 mol H_2}{1 mol Br_2} \times \frac{2.0 g H_2}{1 mol H_2} = 0.6 g H_2 \text{ used}$   
 $20.0 - 0.6 = 19.4 g \text{ remain of } H_2$

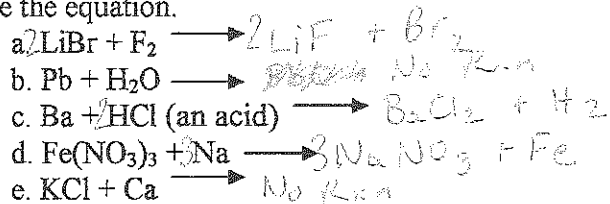
c)  $50.0 g Br_2 \times \frac{1 mol Br_2}{159.8 g Br_2} \times \frac{2 mol HBr}{1 mol Br_2} \times \frac{80.9 g HBr}{1 mol HBr} = 50.6 g HBr$



a)  $1.00 g O_2 \times \frac{1 mol O_2}{32.0 g O_2} \times \frac{2 mol N_2 O_5}{5 mol O_2} \times \frac{108.0 g N_2 O_5}{1 mol N_2 O_5} = 1.35 g N_2 O_5 \text{ theoretically}$   
 $\% \text{ yield} = \frac{1.20 g}{1.35 g} \times 100 = 88.9\%$



15. For each of the following sets of reactants, use the Activity Series chart on page 286 to determine if a reaction will occur. If the reaction does occur, predict the products and balance the equation.



16. Identify each of the following compounds as ionic or covalent. Then name each compound:

- a.  $\text{SO}_2$  cov. sulfur dioxide  
 b.  $\text{Na}_2\text{C}_2\text{O}_4$  ion. sodium oxalate  
 c.  $\text{CaF}_2$  ion. calcium fluoride  
 d.  $\text{CBr}_4$  cov. carbon tetrabromide  
 e.  $\text{NH}_4\text{NO}_2$  ion. ammonium nitrite  
 f.  $\text{P}_2\text{O}_5$  cov. diphosphorus pentoxide  
 g.  $\text{CuSO}_4$  ion. copper sulfate

17. Identify each of the following compounds as ionic or covalent. Then write the formula for each compound.

- a. potassium carbonate ion.  $\text{K}_2\text{CO}_3$   
 b. dinitrogen triiodide cov.  $\text{N}_2\text{I}_3$   
 c. aluminum oxide ion.  $\text{Al}_2\text{O}_3$   
 d. iron(III)phosphate ion.  $\text{FePO}_4$   
 e. strontium hydroxide ion.  $\text{Sr(OH)}_2$