

## Math of Chem Review

1. a)  $\text{NH}_3$  17.0 g/mol      b)  $\text{Al}_2(\text{SO}_4)_3$  294.3 g/mol

2.  $50.5 \text{ g Al}_2\text{O}_3 \times \frac{1 \text{ mol Al}_2\text{O}_3}{102.0 \text{ g Al}_2\text{O}_3} = 0.495 \text{ mol Al}_2\text{O}_3$

3.  $0.680 \text{ mol Xe} \times \frac{6.02 \times 10^{23} \text{ molecules}}{1 \text{ mol Xe}} = 4.09 \times 10^{23} \text{ molecules}$

4.  $3.00 \times 10^{24} \text{ molecules C}_2\text{H}_6 \times \frac{1 \text{ mol}}{6.02 \times 10^{23} \text{ molecules}} \times \frac{30.0 \text{ g}}{1 \text{ mol}} = 150. \text{ g C}_2\text{H}_6$

5.  $\% \text{O} = \frac{48.0 \text{ g O}}{100.1 \text{ g CaCO}_3} \times 100 = 48.0 \%$

6.  $\% \text{H}_2\text{O} = \frac{180. \text{ g H}_2\text{O}}{322.1 \text{ g CaSO}_4 \cdot 10\text{H}_2\text{O}} = 55.9 \%$

7.  $42.1 \text{ g Cl} \times \frac{1 \text{ mol}}{35.5 \text{ g}} = 1.19 \text{ mol Cl} / 0.297 = 4$

$\text{PtCl}_4$

$57.9 \text{ g Pt} \times \frac{1 \text{ mol}}{195.1 \text{ g}} = 0.297 \text{ mol} / 0.297 = 1$

8.  $75.8 \text{ g As} \times \frac{1 \text{ mol}}{74.9 \text{ g}} = 1.01 \text{ mol As}$

$24.2 \text{ g O} \times \frac{1 \text{ mol}}{16.0 \text{ g}} = 1.51 \text{ mol O}$

} double both

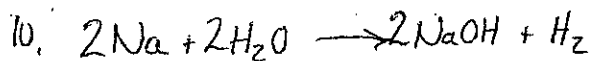
$\text{As}_2\text{O}_3$

9.  $80.0 \text{ g C} \times \frac{1 \text{ mol C}}{12.0 \text{ g C}} = 6.67 \text{ mol C} / 6.67 = 1 \text{ mol C}$

$20.0 \text{ g H} \times \frac{1 \text{ mol H}}{1.0 \text{ g H}} = 20.0 \text{ mol H} / 6.67 = 3 \text{ mol H}$

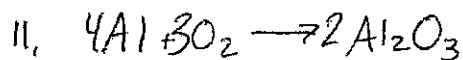
$\text{CH}_3 = \text{emp. form}$

$\frac{30}{15} = 2$   $\text{C}_2\text{H}_6 = \text{molec. form}$



a)  $0.500 \text{ mol Na} \times \frac{1 \text{ mol H}_2}{2 \text{ mol Na}} = 0.250 \text{ mol H}_2$

b)  $40.0 \text{ g H}_2\text{O} \times \frac{1 \text{ mol H}_2\text{O}}{18.0 \text{ g H}_2\text{O}} \times \frac{2 \text{ mol NaOH}}{2 \text{ mol H}_2\text{O}} \times \frac{40.0 \text{ g NaOH}}{1 \text{ mol NaOH}} = 88.9 \text{ g NaOH}$

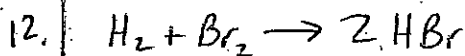


a)  $4.0 \text{ mol Al} \times \frac{3 \text{ mol O}_2}{4 \text{ mol Al}} = 3.0 \text{ mol O}_2 \text{ needed.}$

Al is limiting

b)  $4.0 \text{ mol Al} \times \frac{2 \text{ mol Al}_2\text{O}_3}{4 \text{ mol Al}} = 2.0 \text{ mol Al}_2\text{O}_3$

28  
30  
108



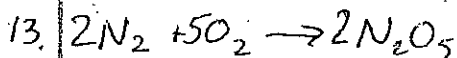
a)  $20.0g H_2 \times \frac{1 \text{ mol } H_2}{2.0g H_2} \times \frac{1 \text{ mol } Br_2}{1 \text{ mol } H_2} \times \frac{159.8g Br_2}{1 \text{ mol } Br_2} = 159.8g \text{ of } Br_2 \text{ needed}$

Br<sub>2</sub> is limiting

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

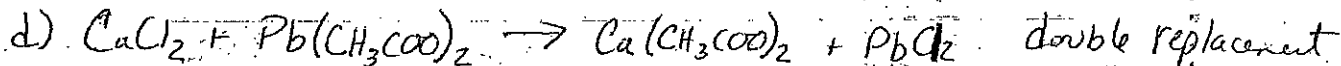
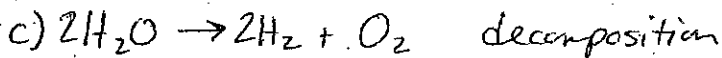
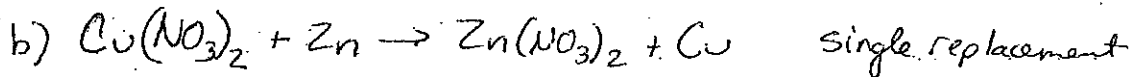
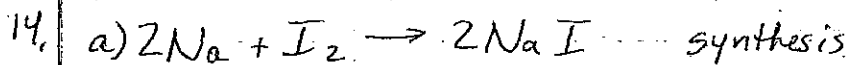
$20.0 - 0.6 = 19.4g \text{ remain of } H_2$

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

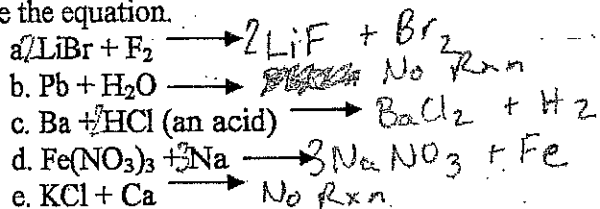


a)  $1.00g O_2 \times \frac{1 \text{ mol } O_2}{32.0g O_2} \times \frac{2 \text{ mol } N_2O_5}{5 \text{ mol } O_2} \times \frac{108.0g N_2O_5}{1 \text{ mol } N_2O_5} = 1.35g N_2O_5 \text{ theoretically}$

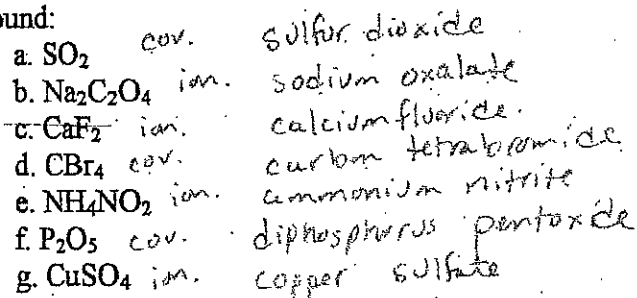
$\% \text{ yield} = \frac{1.20g}{1.35g} \times 100 = 88.9\%$



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:



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

