Chemistry
Review II

1) Stoichiometry
2) Theoretical yield
3) Actual
4) Ratio
5) Limiting
6)

$$2Na_{(s)} + 2HOH_{(l)} \rightarrow 2NaOH_{(aq)} + H_{2(g)}$$

39.6 g Excess ? moles

$$\left(\frac{39.6\text{ g Na}}{1}\right)\left(\frac{1\text{ mole Na}}{23.0\text{ g}}\right)\left(\frac{1\text{ mole } H_2}{2\text{ mole Na}}\right) = \boxed{0.862\text{ mole } H_2}$$

7) $NaClO_3 \xrightarrow{\Delta} NaCl_{(s)} + O_{2(g)}$

238 g ? g

$$\left(\frac{238\text{ g } NaClO_3}{1}\right)\left(\frac{1\text{ mole } NaClO_3}{106.5\text{ g } NaClO_3}\right)\left(\frac{1\text{ mole NaCl}}{1\text{ mole } NaClO_3}\right)\left(\frac{58.5\text{ g NaCl}}{1\text{ mole NaCl}}\right) = \boxed{131\text{ g NaCl}}$$

8) $Sn_{(s)} + 2HF \rightarrow H_{2(g)} + SnF_2$

150.0 g 37.00 g ? g

$$\left(\frac{37.0\text{ g HF}}{1}\right)\left(\frac{1\text{ mole HF}}{20.0\text{ g HF}}\right)\left(\frac{1\text{ mole Sn}}{2\text{ mole HF}}\right)\left(\frac{116.7\text{ g Sn}}{1\text{ mole Sn}}\right) = 108\text{ g Sn Needed}$$

$\therefore$ HF Limiting 150.0 g Sn have − 108 g Sn need = $\boxed{42\text{ g Sn Excess}}$

$$\left(\frac{37.0\text{ g HF}}{1}\right)\left(\frac{1\text{ mole HF}}{20.0\text{ g HF}}\right)\left(\frac{1\text{ mole } SnF_2}{2\text{ mole HF}}\right)\left(\frac{156.7\text{ g } SnF_2}{1\text{ mole } SnF_2}\right) = \boxed{145\text{ g } SnF_2}$$

9) $ZnSO_4 + 2NaOH \rightarrow Zn(OH)_2 + Na_2SO_4$

250.0 g — Excess — 120.66g actual yield

$$\left(\frac{250.0\text{ g } ZnSO_4}{1}\right)\left(\frac{1\text{ mole } ZnSO_4}{161.5\text{ g } ZnSO_4}\right)\left(\frac{1\text{ mole } Zn(OH)_2}{1\text{ mole } ZnSO_4}\right)\left(\frac{99.4\text{ g } Zn(OH)_2}{1\text{ mole } Zn(OH)_2}\right)$$

= 154 g Theoretical yield $Zn(OH)_2$

$$\frac{120.66\text{ g}}{154\text{ g}} \times 100\% = \boxed{78.4\%\text{ Percent yield}}$$

10) $2H_{2(g)} + O_{2(g)} \rightarrow 2H_2O$

Have: 18.51 moles — 19.25 moles — ? g

$$\left(\frac{19.25\text{ moles } O_2}{1}\right)\left(\frac{2\text{ moles } H_2}{1\text{ mole } O_2}\right) = 38.5\text{ moles Need } H_2 \text{ only Have } 18.51$$

$\therefore$ H_2 Limiting

$$\left(\frac{18.51\text{ moles } H_2}{1}\right)\left(\frac{1\text{ mole } O_2}{2\text{ moles } H_2}\right) = 9.26\text{ moles } O_2 \text{ Need, have } 19.25$$

O_2 is Excess

$$\left(\frac{18.51\text{ mole } H_2}{1}\right)\left(\frac{2\text{ moles } H_2O}{2\text{ moles } H_2}\right)\left(\frac{18.0\text{ g } H_2O}{1\text{ mole } H_2O}\right) = \boxed{333\text{ g } H_2O}$$