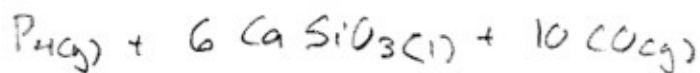
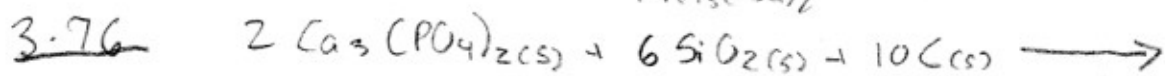


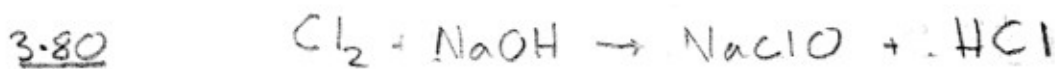
$$0.479 \text{ mole Ni}_3(\text{PO}_4)_2 \cdot \frac{3 \text{ NiCl}_2}{1 \text{ Ni}_3(\text{PO}_4)_2} = \boxed{1.44 \text{ moles NiCl}_2}$$



$$5.0 \text{ g P}_4 \cdot \left(\frac{1 \text{ mol}}{4 \times (30.97) \text{ P}_4 \text{ g}} \right) \cdot \left(\frac{2 \text{ Ca}_3(\text{PO}_4)_2}{1 \text{ P}_4} \right) \cdot \left(\frac{310.18 \text{ g Ca}_3(\text{PO}_4)_2}{1 \text{ mol}} \right) = \boxed{25. \text{ g Ca}}$$



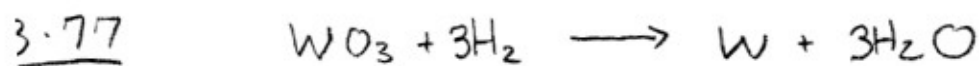
$$651. \text{ kg C}_3\text{H}_6 \cdot \left(\frac{1000. \text{ g}}{1 \text{ kg}} \right) \cdot \left(\frac{1 \text{ mol C}_3\text{H}_6}{42.03} \right) \cdot \left(\frac{4 \text{ C}_3\text{H}_3\text{N}}{4 \text{ C}_3\text{H}_6} \right) \cdot \left(\frac{53.04 \text{ g}}{1 \text{ mol C}_3\text{H}_3\text{N}} \right) = \boxed{8.21 \times 10^5 \text{ C}_3\text{H}_3\text{N}}$$



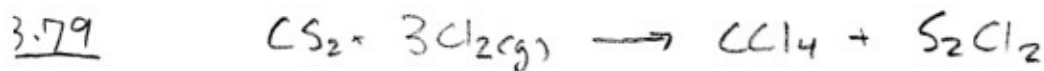
$$61.1 \text{ g NaOH} \cdot \left(\frac{1 \text{ mol NaOH}}{40.0 \text{ g NaOH}} \right) \cdot \left(\frac{1 \text{ mol Cl}_2}{1 \text{ mol NaOH}} \right) \cdot \left(\frac{70.90 \text{ g}}{1 \text{ mol Cl}_2} \right) = \boxed{10 \text{ g Cl}_2}$$



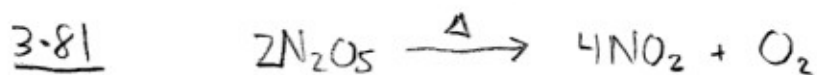
$$5.92 \text{ g Cu}(\text{NO}_3)_2 \cdot \left(\frac{1 \text{ mol}}{187.6 \text{ g}} \right) \cdot \left(\frac{2 \text{ NO}}{3 \text{ Cu}(\text{NO}_3)_2} \right) \cdot \left(\frac{30.0 \text{ g}}{1 \text{ mol NO}} \right) = \boxed{0.631 \text{ g NO}}$$



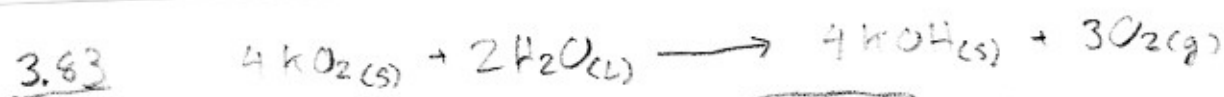
$$1.81 \times 10^3 \text{ g } 4.81 \text{ kg H}_2 \cdot \left(\frac{1 \text{ mol H}_2}{2.01 \text{ g}} \right) \cdot \left(\frac{1 \text{ W}}{3 \text{ H}_2} \right) \cdot \left(\frac{183.9 \text{ g}}{1 \text{ mol W}} \right) = \boxed{147 \text{ g W}}$$



$$62.7 \text{ g Cl}_2 \cdot \left(\frac{1 \text{ mol Cl}_2}{70.9 \text{ g Cl}_2} \right) \cdot \left(\frac{1 \text{ CS}_2}{3 \text{ Cl}_2} \right) \cdot \left(\frac{76.2 \text{ g}}{1 \text{ mol CS}_2} \right) = \boxed{22.5 \text{ g CS}_2}$$

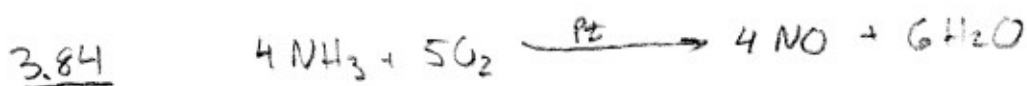


$$1.315 \text{ g O}_2 \cdot \left(\frac{1 \text{ mol O}_2}{32.00 \text{ g}} \right) \cdot \left(\frac{4 \text{ NO}_2}{1 \text{ O}_2} \right) \cdot \left(\frac{46.01 \text{ g}}{1 \text{ mol NO}_2} \right) = \boxed{7.563 \text{ g NO}_2}$$



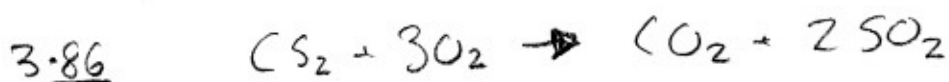
$$0.25 \text{ mol KO}_2 \cdot \left(\frac{3 \text{ O}_2}{4 \text{ KO}_2} \right) = \boxed{0.19 \text{ mol O}_2} = \text{LR}$$

$$0.15 \text{ mol H}_2\text{O} \cdot \left(\frac{3 \text{ O}_2}{2 \text{ H}_2\text{O}} \right) = 0.23 \text{ mol O}_2$$



$$0.120 \text{ mol NH}_3 \cdot \left(\frac{4 \text{ NO}}{4 \text{ NH}_3} \right) = 0.120 \text{ mol NO}$$

$$0.140 \text{ mol O}_2 \cdot \left(\frac{4 \text{ NO}}{5 \text{ O}_2} \right) = \boxed{0.112 \text{ mol NO}} = \text{LR}$$



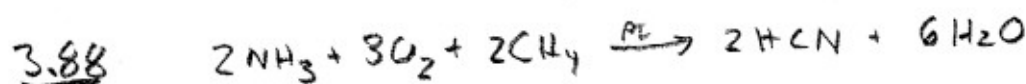
$$30.0 \text{ g CS}_2 \cdot \left(\frac{1 \text{ mol CS}_2}{76.14 \text{ g}} \right) \cdot \left(\frac{2 \text{ SO}_2}{1 \text{ CS}_2} \right) \cdot \left(\frac{64.07 \text{ g SO}_2}{\text{mol SO}_2} \right) = 50.5 \text{ g SO}_2$$

$$35.0 \text{ g O}_2 \cdot \left(\frac{1 \text{ mol O}_2}{32.0 \text{ g}} \right) \cdot \left(\frac{2 \text{ SO}_2}{3 \text{ O}_2} \right) \cdot \left(\frac{64.07 \text{ g SO}_2}{\text{mol SO}_2} \right) = \boxed{46.7 \text{ g SO}_2}$$

LR

$$35.0 \text{ g O}_2 \cdot \left(\frac{1 \text{ mol O}_2}{32.0 \text{ g}} \right) \cdot \left(\frac{1 \text{ mol CS}_2}{3 \text{ mol O}_2} \right) \cdot \left(\frac{76.14 \text{ g CS}_2}{1 \text{ mol CS}_2} \right) = 27.8 \text{ g CS}_2 \text{ needed}$$

$$30.0 \text{ g} - 27.8 \text{ g} = \boxed{2.2 \text{ g CS}_2 \text{ Left Over}}$$

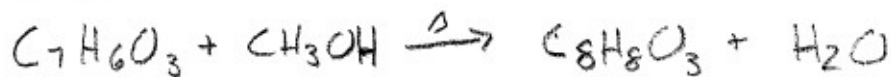


$$11.5 \text{ g NH}_3 \cdot \left(\frac{1 \text{ mol NH}_3}{17.03 \text{ g}} \right) \cdot \left(\frac{2 \text{ HCN}}{2 \text{ NH}_3} \right) \cdot \left(\frac{27.03 \text{ g HCN}}{\text{mol HCN}} \right) = 18.3 \text{ g HCN}$$

$$10.0 \text{ g O}_2 \cdot \left(\frac{1 \text{ mol O}_2}{32.0 \text{ g}} \right) \cdot \left(\frac{2 \text{ HCN}}{3 \text{ O}_2} \right) \cdot \left(\frac{27.03 \text{ g HCN}}{\text{mol HCN}} \right) = \boxed{5.63 \text{ g HCN}} = \text{LR}$$

$$10.5 \text{ g CH}_4 \cdot \left(\frac{1 \text{ mol CH}_4}{16.0 \text{ g}} \right) \cdot \left(\frac{2 \text{ HCN}}{2 \text{ CH}_4} \right) \cdot \left(\frac{27.03 \text{ g HCN}}{\text{mol HCN}} \right) = 17.7 \text{ g HCN}$$

3.90



$$1.50g \cdot \left(\frac{1 \text{ mol}}{138.1g}\right) \cdot \left(\frac{1}{1}\right) \cdot \left(\frac{152.1g}{\text{mol}}\right) = 1.65g C_8H_8O_3$$

$$11.20g \cdot \left(\frac{1 \text{ mol}}{32.0}\right) \cdot \left(\frac{1}{1}\right) \cdot \left(\frac{152.1g}{\text{mol}}\right) = 53.2g C_8H_8O_3$$

$$\frac{1.31g C_8H_8O_3}{1.65g C_8H_8O_3} \times 100 = \boxed{79.4\% \text{ yield}}$$

3.113

$$(10.0 \text{ cm} \times 20.0 \text{ cm} \times 15.0 \text{ cm}) \cdot \left(\frac{8.17 \text{ g Alloy}}{\text{cm}^3}\right) \cdot \left(\frac{54.7g \text{ Fe}}{100 \text{ g Alloy}}\right) \cdot \left(\frac{1 \text{ mol Fe}}{55.85g \text{ Fe}}\right)$$

$$\boxed{1.45 \times 10^{26} \text{ atoms}}$$

$$\rightarrow \frac{6.02 \times 10^{23} \text{ atom Fe}}{\text{mole Fe}} =$$

3.108

$$\text{Let } x = \text{mass } Fe_2O_3 \quad 100 - x = \text{mass } FeO$$

$$Fe_2O_3 = \frac{159.7g}{\text{mol}} \Rightarrow 70.0\% \text{ Fe}$$

$$FeO = \frac{71.85g}{\text{mol}} = 77.8\% \text{ Fe}$$

$$\frac{(0.700)(x) + (0.778)(100 - x)}{100} = \frac{72}{100} = \% \text{ Fe in Mix}$$

$$.700x + 77.8 - .778x = 72$$

$$-0.078x = -5.8$$

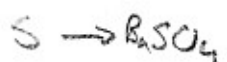
$$\boxed{x = 74.4g Fe_2O_3} = 74.4\% Fe_2O_3$$

$$25.6g FeO$$

$$.744 \times 0.5 =$$

$$\rightarrow 0.372g Fe_2O_3$$

3.110

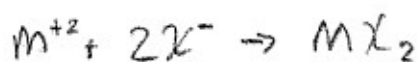


$$5.46 \text{ mg} \cdot \left(\frac{1 \text{ mol SO}_4}{233.4 \text{ g}} \right) \left(\frac{1 \text{ mol S}}{1 \text{ mol SO}_4} \right) \left(\frac{32.01 \text{ g}}{1 \text{ mol S}} \right) = 0.751 \text{ mg S}$$

$$\frac{0.751 \text{ mg S}}{8.19 \text{ mg Sample}} = 9.17\% \text{ S}$$

$$\frac{0.751 \text{ mg S}}{8.19 \text{ mg Penn}} = \frac{32.01 \text{ g/mol}}{x \text{ g/mol}} \quad \boxed{x = \frac{350.9 \text{ g}}{\text{mol}}}$$

3.112



1.92g + (0.158 mol) MM = mass MX₂

86.8% mass = X

13.2% mass = M

$$\frac{1.92 \text{ g } M^{+2}}{1.92 + (0.158)(MM)} = 0.132\% M^{+2}$$

$$1.92 = (0.132) [1.92 + (0.158)(MM)]$$

$$1.92 = 0.253 + 0.0209 \text{ mm}$$

$$\text{mm} = 79.8 \text{ g/mol} = \text{Br}$$

$$\frac{(2 \times 79.9)}{M + (2 \times 79.9)} = .868\% \text{ Br}$$

$$159.8 = .868 M + (159.8)(.868)$$

$$159.6 = .868 M + 139$$

$$m = 24.3 \text{ g/mol}$$

