STOICH. Worksheet 4

$$16.0\text{ g } Fe_2O_3 \left|\frac{1\text{ mol } Fe_2O_3}{159.6\text{ g } Fe_2O_3}\right|\frac{3\text{ mol } O_2}{2\text{ mol } Fe_2O_3}\left|\frac{22.4\text{ L } O_2}{1\text{ mol } O_2}\right| = \boxed{3.37\text{ L } O_2}$$

b. $$10.0\text{ L } O_2 \left|\frac{1\text{ mol } O_2}{22.4\text{ L } O_2}\right|\frac{4\text{ mol Fe}}{3\text{ mol } O_2}\left|\frac{55.8\text{ g Fe}}{1\text{ mol Fe}}\right| = \boxed{33.2\text{ g Fe}}$$

c. $$6.50\text{ g Fe} \left|\frac{1\text{ mol Fe}}{55.8\text{ g Fe}}\right|\frac{3\text{ mol } O_2}{4\text{ mol Fe}}\left|\frac{6.02\times10^{23}\text{ molec } O_2}{1\text{ mol } O_2}\right| = \boxed{5.26\times10^{22}\text{ molec. } O_2}$$

d. $$6.43\times10^{24}\text{ molec. } Fe_2O_3 \left|\frac{1\text{ mol } Fe_2O_3}{6.02\times10^{23}\text{ molec}}\right|\frac{4\text{ mol Fe}}{2\text{ mol } Fe_2O_3}\left|\frac{55.8\text{ g Fe}}{1\text{ mol Fe}}\right|\frac{1\text{ cm}^3\text{ Fe}}{7.86\text{ g Fe}}$$

$$= \boxed{152\text{ cm}^3\text{ Fe}}$$

2a. $$15.5\text{ L } NO_2 \left|\frac{1\text{ mol } NO_2}{22.4\text{ L } NO_2}\right|\frac{1\text{ mol } H_2O}{3\text{ mol } NO_2}\left|\frac{18.0\text{ g } H_2O}{1\text{ mol } H_2O}\right| = \boxed{4.15\text{ g } H_2O}$$

b. $$100.0\text{ g } H_2O \left|\frac{1\text{ mol } H_2O}{18.0\text{ g } H_2O}\right|\frac{1\text{ mol NO}}{1\text{ mol } H_2O}\left|\frac{22.4\text{ L NO}}{1\text{ mol NO}}\right| = \boxed{124\text{ L NO}}$$

c. $$42.0\text{ L NO} \left|\frac{1\text{ mol NO}}{22.4\text{ L NO}}\right|\frac{3\text{ mol } NO_2}{1\text{ mol NO}}\left|\frac{22.4\text{ L } NO_2}{1\text{ mol } NO_2}\right| = \boxed{126\text{ L } NO_2}$$

d. $$46.0\text{ L NO} \left|\frac{1\text{ mol NO}}{22.4\text{ L NO}}\right|\frac{1\text{ mol } H_2O}{1\text{ mol NO}}\left|\frac{6.02\times10^{23}\text{ molec. } H_2O}{1\text{ mol } H_2O}\right|\frac{2\text{ atoms H}}{1\text{ molec. } H_2O}$$

$$= \boxed{2.47\times10^{24}\text{ atoms H}}$$

3. $Mg_{(s)} + 2HNO_{3(aq)} \longrightarrow Mg(NO_3)_{2(aq)} + H_{2(g)}$

i) $\frac{40.0\text{ g Mg}}{} \left| \frac{1\text{ mol Mg}}{24.3\text{ g Mg}} \right| \frac{1\text{ mol } H_2}{1\text{ mol Mg}} \left| \frac{22.4\text{ L } H_2}{1\text{ mol } H_2} \right| = \boxed{36.9\text{ L } H_2}$

4. $C_5H_{12(g)} + 8O_{2(g)} \longrightarrow 5CO_{2(g)} + 6H_2O_{(g)}$

a. $\frac{48.0\text{ L } CO_2}{} \left| \frac{1\text{ mol } CO_2}{22.4\text{ L } CO_2} \right| \frac{8\text{ mol } O_2}{5\text{ mol } CO_2} \left| \frac{22.4\text{ L } O_2}{1\text{ mol } O_2} \right| = \boxed{76.8\text{ L } O_2}$

b. $\frac{106\text{ L } CO_2}{} \left| \frac{1\text{ mol } CO_2}{22.4\text{ L } CO_2} \right| \frac{6\text{ mol } H_2O}{5\text{ mol } CO_2} \left| \frac{22.4\text{ L } H_2O}{1\text{ mol } H_2O} \right| = \boxed{127.2\text{ L } H_2O}$

c. $\frac{80.0\text{ L } CO_2}{} \left| \frac{1\text{ mol } CO_2}{22.4\text{ L } CO_2} \right| \frac{1\text{ mol } C_5H_{12}}{5\text{ mol } CO_2} \left| \frac{72.0\text{ g } C_5H_{12}}{1\text{ mol } C_5H_{12}} \right| = \boxed{51.4\text{ g } C_5H_{12}}$

5. $2HgO \longrightarrow 2Hg_{(l)} + O_{2(g)}$

i) $\frac{30.5\text{ L } O_2}{} \left| \frac{1\text{ mol } O_2}{22.4\text{ L } O_2} \right| \frac{2\text{ mol } HgO}{1\text{ mol } O_2} \left| \frac{216.6\text{ g } HgO}{1\text{ mol } HgO} \right| = \boxed{5.90\times10^2\text{ g } HgO}$

ii) $\frac{295\text{ g } HgO}{} \left| \frac{1\text{ mol } HgO}{216.6\text{ g } HgO} \right| \frac{2\text{ mol } Hg}{2\text{ mol } HgO} \left| \frac{200.6\text{ g } Hg}{1\text{ mol } Hg} \right| \frac{1\text{ cm}^3\text{ Hg}}{13.6\text{ g Hg}} = \boxed{20.1\text{ cm}^3\text{ Hg}}$

6. $Mg + 2HCl \longrightarrow MgCl_2 + H_2$

i) $\frac{84.0\text{ L } H_2}{} \left| \frac{1\text{ mol } H_2}{22.4\text{ L } H_2} \right| \frac{1\text{ mol Mg}}{1\text{ mol } H_2} \left| \frac{24.3\text{ g Mg}}{1\text{ mol Mg}} \right| \frac{1\text{ cm}^3\text{ Mg}}{1.74\text{ g Mg}} = \boxed{52.4\text{ cm}^3\text{ Mg}}$