1.
$$\frac{1.75\text{ g }C_7H_6O_3}{}\left|\frac{1\text{ mol }C_7H_6O_3}{138.0\text{ g }C_7H_6O_3}\right|\frac{1\text{ mol }C_8H_8O_3}{1\text{ mol }C_7H_6O_3}\left|\frac{152.0\text{ g }C_8H_8O_3}{1\text{ mol }C_8H_8O_3}\right.$$

$$= 1.93\text{ g }C_8H_8O_3$$

$$\%\text{ yield} = \frac{\text{actual}}{\text{theoretical}} \times 100 = \frac{1.42\text{ g }C_8H_8O_3}{1.93\text{ g }C_8H_8O_3} \times 100 = 73.6\%$$

2.
$$\frac{8.0\text{ g }O_2}{}\left|\frac{1\text{ mol }O_2}{32.0\text{ g }O_2}\right|\frac{2\text{ mol }H_2O}{3\text{ mol }O_2}\left|\frac{18.0\text{ g }H_2O}{1\text{ mol }H_2O}\right. = 3.0\text{ g }H_2O$$

$$\%\text{ yield} = \frac{\text{actual}}{\text{theoretical}} \times 100 = \frac{2.3\text{ g }H_2O}{3.0\text{ g }H_2O} \times 100 = 77\%$$

3.
$$\frac{5.50\text{ g }H_2}{}\left|\frac{1\text{ mol }H_2}{2.02\text{ g }H_2}\right|\frac{2\text{ mol }NH_3}{3\text{ mol }H_2}\left|\frac{17.0\text{ g }NH_3}{1\text{ mol }NH_3}\right. = 30.9\text{ g }NH_3$$

$$\%\text{ yield} = \frac{\text{actual}}{\text{theoretical}} \times 100 = \frac{20.4\text{ g }NH_3}{30.9\text{ g }NH_3} \times 100 = 66.0\%$$

4.

$$\frac{66.0\text{ g }Cr(OH)_3}{} \left| \frac{1\text{ mol }Cr(OH)_3}{103.0\text{ g }Cr(OH)_3} \right| \frac{1\text{ mol }NaCr(OH)_4}{1\text{ mol }Cr(OH)_3} \left| \frac{143.0\text{ g }NaCr(OH)_4}{1\text{ mol }NaCr(OH)_4} \right.$$

$$= 91.6\text{ g }NaCr(OH)_4$$

$$\%\text{ yield} = \frac{\text{actual}}{\text{theoretical}} \times 100 = \frac{38.4\text{ g }NaCr(OH)_4}{91.6\text{ g }NaCr(OH)_4} \times 100 = 41.9\%$$

5.

$$\frac{6.0\text{ g CO}}{} \left| \frac{1\text{ mol CO}}{28.0\text{ g CO}} \right| \frac{3\text{ mol }CO_2}{3\text{ mol CO}} \left| \frac{44.0\text{ g }CO_2}{1\text{ mol }CO_2} \right. = 9.4\text{ g }CO_2$$

$$\%\text{ yield} = \frac{\text{actual}}{\text{theoretical}} \times 100 = \frac{8.9\text{ g }CO_2}{9.4\text{ g }CO_2} \times 100 = 95\%$$

6. (3, 2, 5 points)

a) $2\ AlBr_3 + 3\ Mg \Longrightarrow 3\ MgBr_2 + 2\ Al$

b) Single Displacement

c)

$$\frac{10.8\text{ g }AlBr_3}{} \left| \frac{1\text{ mol }AlBr_3}{266.7\text{ g }AlBr_3} \right| \frac{2\text{ mol }Al}{2\text{ mol }AlBr_3} \left| \frac{27.0\text{ g }Al}{1\text{ mol }Al} \right. = 1.09\text{ g }Al$$

$$\%\text{ yield} = \frac{\text{actual}}{\text{theoretical}} \times 100 = \frac{0.8\text{ g }Al}{1.09\text{ g }Al} \times 100 = 70\%$$

7. (3,2,5 points)

a) $Al(OH)_3 + 3\ HCl \Longrightarrow AlCl_3 + 3\ H_2O$

b) Double Displacement

c)

$$\frac{0.50\text{ g }Al(OH)_3}{} \left| \frac{1\text{ mol }Al(OH)_3}{78.0\text{ g }Al(OH)_3} \right| \frac{3\text{ mol }H_2O}{1\text{ mol }Al(OH)_3} \left| \frac{18.0\text{ g }H_2O}{1\text{ mol }H_2O} \right. = 0.35\text{ g }H_2O$$

$$\%\text{ yield} = \frac{\text{actual}}{\text{theoretical}} \times 100 = \frac{0.28\text{ g }H_2O}{0.35\text{ g }H_2O} \times 100 = 8.0 \times 10^1\%\ (80\%)$$

Limiting Reactant

A)

$$\frac{4.11\text{ g } I_2 \;\Big|\; 1\text{ mol } I_2}{\Big|\; 253.8\text{ g } I_2} = 0.0162\text{ mol } I_2 / 1 = 0.0162\text{ mol } I_2$$

$$\frac{0.48\text{ g } H_2S \;\Big|\; 1\text{ mol } H_2S}{\Big|\; 34.1\text{ g } H_2S} = 0.014\text{ mol } H_2S / 1 = \underline{\mathbf{0.014}}\text{ mol } H_2S$$

H_2S is the limiting reactant

B) $3\,Zn + 2\,BCl_3 \Longrightarrow 3\,ZnCl_2 + 2\,B$

$$\frac{6.7\text{ g Zn} \;\Big|\; 1\text{ mol Zn}}{\Big|\; 65.4\text{ g Zn}} = 0.10\text{ mol Zn} \;/\; 3 = \mathbf{0.034\text{ mol Zn}}$$

$$\frac{23.5\text{ g } BCl_3 \;\Big|\; 1\text{ mol } BCl_3}{\Big|\; 117.3\text{ g } BCl_3} = 0.200\text{ mol } BCl_3 \;/\; 2 = 0.100\text{ mol } BCl_3$$

Zn is the limiting reactant