1) $$\frac{45\,g\ H_2O}{} \times \frac{1\ mole}{18\,g} = 2.5\ moles$$

2) $$\frac{55\,g\ NaCl}{} \times \frac{6.02\times10^{23}}{58\,g} = 5.7\times10^{23}$$

3) $$\frac{805\,g}{} \times \frac{1\ mole}{98\,g} = 8.21\ moles$$

4) oops → ~~1.2×10~~ 4005

$$\frac{4005\ molecules}{} \times \frac{18\,g}{6.02\times10^{23}\ molecules} = 1.2\times10^{-19}$$

5) $$\frac{6.02\times10^{23}\ atoms\ Hg}{} \times \frac{201\,g}{6.02\times10^{23}\ atoms\ Hg} = 201\,g$$

6) a) work both amounts into Cu_2S:

$$\frac{405\,g\ CuCl}{} \times \frac{1\ mole}{99\,g} \times \frac{1\ Cu_2S}{2\ CuCl} \times \frac{160\,g}{1\ mole} = 327.3\,g\ Cu_2S$$

$$\frac{200\,mL\ H_2S}{} \times \frac{0.8\,g}{1\,mL} \times \frac{1\ Cu_2S}{1\ H_2S} \times \frac{1\ mole}{34\,g} \times \frac{160\,g}{1\ mole} = 753\,g\ Cu_2S$$

use density. I did out of order.

CuCl gave lower answer so its the limiting reactant.

c) The lowest answer is answer here so its $\boxed{327.3g\ CuCl}$ ← Hannah made me do that.

b) This is where you turn the limiting reactant into the excess.

$$\frac{405g\ CuCl}{} \bigg| \frac{1\,mole}{99g} \bigg| \frac{1\ H_2S}{2\ CuCl} \bigg| \frac{34g}{1\,mole} = 69.5g$$

You start with $200\,mL\left(\frac{.8g}{1\,mL}\right) = 160g$

so
$$\begin{array}{r} 160 \\ -\ 69.5 \\ \hline \end{array}$$
$\boxed{90.5g\ \text{excess}\ H_2S}$

6 b) $$\frac{35g\ HCl}{} \bigg| \frac{1\,mole}{36g} \bigg| \frac{2\ CuCl}{2\ HCl} \bigg| \frac{99g}{1\,mole} = \boxed{96.25g\ CuCl}$$

7) $$\frac{25.5g\ Ca(OH)_2}{} \bigg| \frac{1\,mole}{74g} \bigg| \frac{1\ Ca_3(PO_4)_2}{3\ Ca(OH)_2} \bigg| \frac{310g}{1\,mole} = 35.6g$$

$$\frac{25.5g\ H_3PO_4}{} \bigg| \frac{1\,mole}{98g} \bigg| \frac{1\ Ca_3(PO_4)_2}{2\ H_3PO_4} \bigg| \frac{310g}{1\,mole} = 40.3g$$

So the H_3PO_4 is in excess, 35.6g of $Ca_3(PO_4)_2$ are produced

$$\frac{25.5\text{g } Ca(OH)_2}{} \left| \frac{1\text{ mole}}{74\text{g}} \right| \frac{2\ H_3PO_4}{3\ Ca(OH)_2} \left| \frac{98\text{g}}{1\text{ mole}} \right. = 22.5\text{g } H_3PO_4$$

$$\begin{array}{r} 25.5 \\ -\ 22.5 \\ \hline \end{array}$$

3g left over

7 b) $$\frac{10\text{g } H_3PO_4}{} \left| \frac{1\text{ mole}}{98\text{g}} \right| \frac{3\ Ca(OH)_2}{2\ H_3PO_4} \left| \frac{6.02\times10^{23}}{1\text{ mole}} \right. = 9.2\times10^{22}$$

8) a) $$\frac{300\text{g NaOH}}{} \left| \frac{1\text{ mole}}{40\text{g}} \right| \frac{3\ NaCl}{4\ NaOH} \left| \frac{58\text{g}}{1\text{ mole}} \right. = 326.25\text{g}$$

↑ theoretical yield

$$\frac{250}{326.25} \times 100 = 76.6\%$$

b) $$\frac{200\text{ moles NaOH}}{} \left| \frac{2\ H_2O}{4\ NaOH} \right| \frac{18\text{g}}{1\text{ mole}} = 1800\text{g } H_2O$$