

Chapter 3 Probs

$$33. \quad 207.217 \text{ amu } \text{ Pb}$$

$$35. \quad 184.953 \text{ amu}$$

$$43. \quad 1.00 \cdot 10^{23} \text{ C atoms}$$

$$59. \quad 2.77 \cdot 10^{19} \text{ molecules}$$

$$3.26 \cdot 10^{-3} \text{ g Cl}$$

$$65 \text{ a) } 165.4 \text{ g/mol} \quad \begin{matrix} \pm .05 \text{ cm} \\ R_f \text{ ----} \end{matrix}$$

$$b) \quad 1.820 \cdot 10^{24} \text{ molecules}$$

$$c) \quad 3.3 \text{ g}$$

$$d) \quad 5.5 \cdot 10^{22} \text{ Cl atoms}$$

$$e) \quad 1.6 \text{ g Cl}$$

$$f) \quad 1.37 \cdot 10^{-19} \text{ g}$$

$$59 \quad 5.56 \text{ mg} \cdot \frac{1 \text{ g}}{1000 \text{ mg}} \cdot \frac{1 \text{ mol}}{120.9 \text{ g}} \cdot \frac{N_A}{1 \text{ mol}}$$

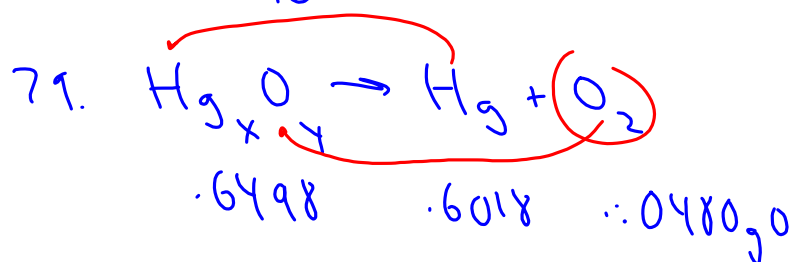
$$= 2.77 \cdot 10^{19} \text{ molecules}$$

$$5.56 \text{ mg} \cdot \frac{1 \text{ g}}{1000 \text{ mg}} \cdot \frac{1 \text{ mol}}{120.9 \text{ g}} \cdot \frac{2 \text{ mol Cl}}{1 \text{ mol Fe}} \cdot \frac{35.5 \text{ g Cl}}{1 \text{ mol Cl}}$$

$$= 3.26 \cdot 10^{-3} \text{ g Cl}$$

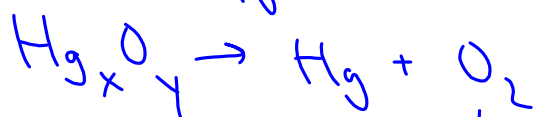
$$71. \frac{.00390}{1.00} = \frac{63.54 \cdot y}{x}$$

$$x = 65,200 \text{ nm}$$



$$.6018 \text{ g Hg} \cdot \frac{1}{200.6} = .00300 > \text{HgO}$$

$$.0480 \text{ g O} \cdot \frac{1}{16} = .00300$$



$.4172$

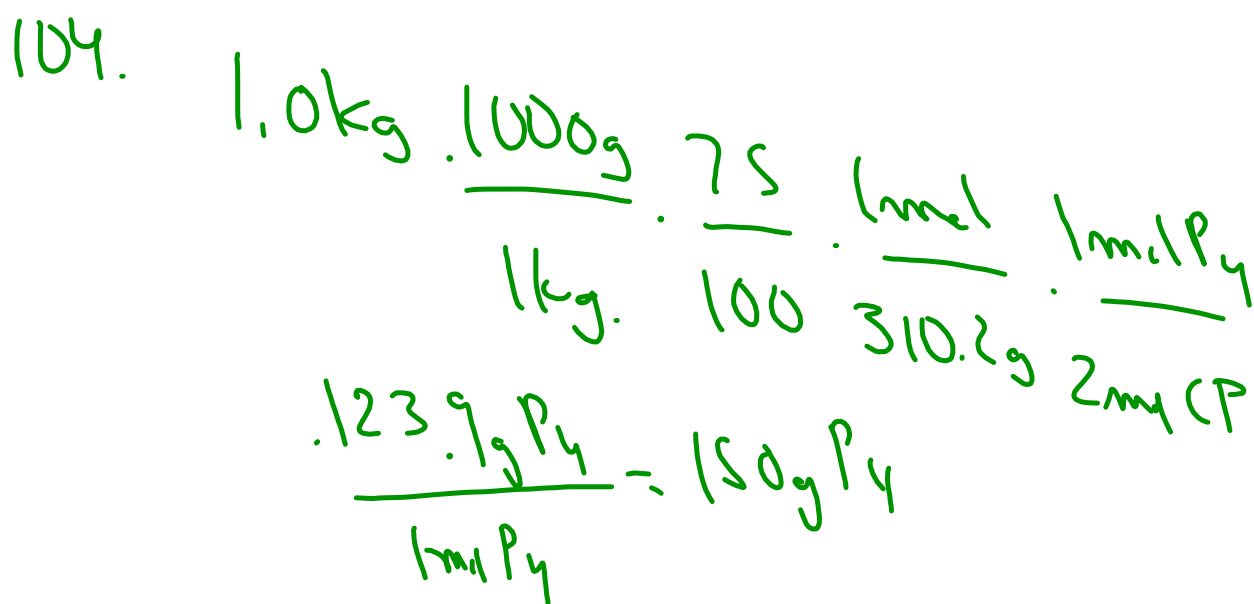
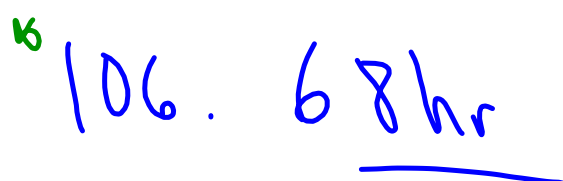
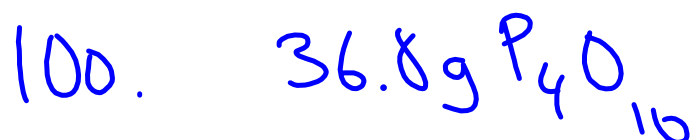
$.016 \text{ g}$

$.4172$

$-.0160$

$$.4012 \text{ g Hg} \cdot \frac{1}{200.6} = .00200 \text{ Hg}$$

$$.016 \text{ g O} \cdot \frac{1}{16} = .00100 \text{ O} > \text{Hg}_2\text{O}$$



110.



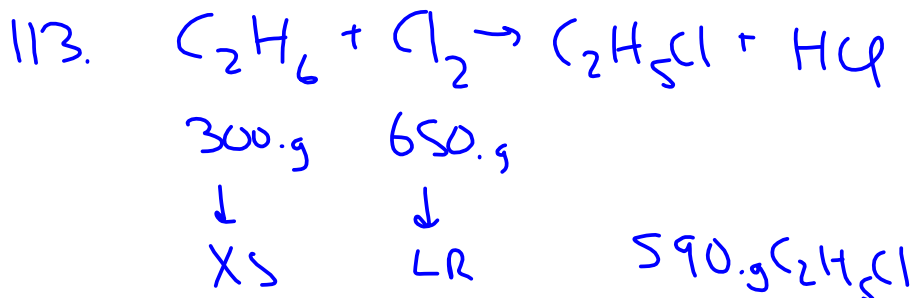
$$\text{CP: } 1000\text{g CP} \cdot \frac{1\text{mol CP}}{310.2\text{g CP}} \cdot \frac{3\text{mol CS}}{1\text{mol CP}} \cdot \frac{136\text{g CS}}{1\text{mol CS}} = 1300\text{g CaSO}_4$$

$$\text{H}_2\text{SO}_4: 1000\text{g H}_2\text{SO}_4 \cdot \frac{98}{100} \cdot \frac{1\text{mol H}_2\text{SO}_4}{98.0\text{g}} \cdot \frac{3\text{mol CS}}{3\text{mol H}_2\text{SO}_4}$$

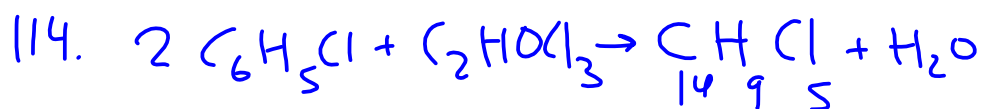
$$\frac{136\text{g CS}}{1\text{mol CS}} = 1400\text{g CS}$$



$$1000\text{g CP} \cdot \frac{1\text{mol CP}}{310.2\text{g CP}} \cdot \frac{2\text{mol H}_3\text{PO}_4}{1\text{mol CP}} \cdot \frac{98.0\text{g H}_3\text{PO}_4}{1\text{mol}} = 630\text{g H}_3\text{PO}_4$$



$$\frac{490}{590} \times 100 = 83.0\% \text{ yield}$$



$$a) \quad 1142 \text{ g CB} \cdot \frac{1 \text{ mol CB}}{112.5 \text{ g CB}} \cdot \frac{1 \text{ mol DDT}}{2 \text{ mol CB}} \cdot \frac{354.5 \text{ g DDT}}{1 \text{ mol DDT}} = 1799 \text{ g DDT}$$

$$485 \text{ g Ch} \cdot \frac{1 \text{ mol Ch}}{147.5 \text{ g Ch}} \cdot \frac{1 \text{ mol DDT}}{1 \text{ mol Ch}} \cdot \frac{354.5 \text{ g DDT}}{1 \text{ mol DDT}} =$$

$$\frac{1166 \text{ g DDT}}{1170 \text{ g DDT}}$$

b) LR = chloral XS = chlorobenzene

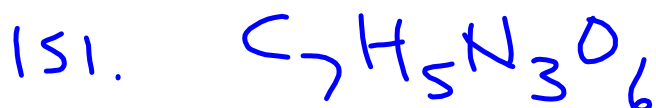
$$c) \quad 485 \text{ g Ch} \cdot \frac{1 \text{ mol Ch}}{147.5 \text{ g Ch}} \cdot \frac{2 \text{ mol CB}}{1 \text{ mol Ch}} \cdot \frac{112.5 \text{ g CB}}{1 \text{ mol CB}}$$

$$\therefore \begin{array}{r} 1142 \\ - 740. \\ \hline 402 \text{ g XS} \end{array} = 740 \text{ g of CB reacts}$$

$$d) \quad \frac{200.0}{1170} \times 100 = 17.1\%$$

$$116 \quad \underset{\text{Actual}}{120. \text{ g PF}_3} \times \frac{\overset{\text{theoretical}}{100 \text{ g PF}_3}}{\underset{\text{Actual}}{78.0 \text{ g PF}_3}} = \underset{\text{theoretical}}{154 \text{ g PF}_3}$$

$$154 \text{ g PF}_3 \cdot \frac{1 \text{ mol PF}_3}{88.0 \text{ g PF}_3} \cdot \frac{6 \text{ mol F}_2}{4 \text{ mol PF}_3} \cdot \frac{38.0 \text{ g F}_2}{1 \text{ mol F}_2} = \underline{99.8 \text{ g F}_2}$$



169. Molar mass = $\frac{\text{grams}}{\text{mole}} = \frac{.105g}{8.92 \cdot 10^{28} \cdot \frac{1\text{mol}}{N_A}}$

$N_A = 6.02 \cdot 10^{23}$

$X_2 = 70.9 g/mol$

$\therefore \text{mass } X = \frac{1}{2}(70.9) = 35.5 g/mol = Cl$



$$54.47g Cl \cdot \frac{1\text{mol } Cl}{35.5g Cl} = 1.537\text{mol } Cl$$

$$1.537\text{mol } Cl \cdot \frac{1\text{mol } M}{3\text{mol } Cl} = .5123\text{mol } M$$

Molar mass $M = \frac{45.53g}{.5123\text{mol}} = 88.9 g/mol = Y$

(Yttrium)