HOW TO WRITE A PROBLEM UP.

1. Any problem you hand in should clearly show and explain your work.

2. Answers should have labels and units.

3. Do scratch calculations elsewhere (scratch paper...)

4. Note the significant figures given and use at least 1 additional significant figure in the intermediate calculations. Round down to the correct number of significant figures at the end of the calculation. This will guarantee that your answer will be accurate to the required number of significant figures.

5. Your problem write-up should be something you can come back to in a year, read it and understand it. You will be responsible for this material in General Chemistry in your future courses at Hamline and elsewhere.

EXAMPLES OF WHAT NOT TO DO...

1. Loss of accuracy because of poor rounding and reduced number of sig. figs.

$$(1.5\ g\ C_7H_6O_3)\left(\frac{1\ mol\ C_7H_6O_3}{138\ g\ MW\ C_7H_6O_3}\right)\left(\frac{1\ mol\ C_8H_8O_3}{1\ mol\ C_7H_6O_3}\right)=0.011\ mol\ C_8H_8O_3$$

$$(11.2\ g\ CH_3OH)\left(\frac{1\ mol\ CH_3OH}{32\ g\ MW\ CH_3OH}\right)\left(\frac{1\ mol\ C_8H_8O_3}{1\ mol\ CH_3OH}\right)=0.35\ mol\ C_8H_8O_3$$

$C_7H_6O_3$ *is the limiting reagent*

$$(0.011\ mol\ C_8H_8O_3)\times\left(\frac{152\ g\ C_8H_8O_3}{1\ mol\ C_8H_8O_3}\right)=1.67\ g\ C_8H_8O_3$$

$$Percent\ Yield=\frac{1.31}{1.67}\times 100=78.4\%$$

2. Loss of accuracy because of poor rounding and reduced number of sig. figs. and illogical statements (changing an equality to an inequality.)

$$(1.5\ g\ C_7H_6O_3)\left(\frac{1\ mol\ C_7H_6O_3}{138\ g\ MW\ C_7H_6O_3}\right)\left(\frac{1\ mol\ C_8H_8O_3}{1\ mol\ C_7H_6O_3}\right)\ \neq\ 0.011\ mol\ C_8H_8O_3\left(\frac{152\ g\ C_8H_8O_3}{1\ mol\ C_8H_8O_3}\right)=1.67\ g\ C_8H_8O_3$$

$$(11.2\ g\ CH_3OH)\left(\frac{1\ mol\ CH_3OH}{32\ g\ MW\ CH_3OH}\right)\left(\frac{1\ mol\ C_8H_8O_3}{1\ mol\ CH_3OH}\right)=0.35\ mol\ C_8H_8O_3$$

$C_7H_6O_3$ *is the limiting reagent*

$$Percent\ Yield=\frac{1.31}{1.67}\times 100=78.4\%$$

3. No labels, loss of sig. figs. in intermediate calculation, wrong # sig. fig. at end.

$$\left(\frac{1.5}{138}\right) = 0.011, \quad (11.2)\left(\frac{1}{32}\right) = 0.35$$

$$(0.011)\times 152 = 1.67 \quad \frac{1.31}{1.67}\times 100 = 78$$

4. A No credit write-up

78%

A GOOD EXAMPLE OF HOW TO WRITE UP A PROBLEM.

For the reaction: $C_7H_6O_3 + CH_3OH \Rightarrow C_8H_8O_3 + H_2O$

Calculate the number of moles of methyl salicylate ($C_8H_8O_3$) possible from 1.50 g of salicylic acid ($C_7H_6O_3$) and from 11.20 g of methanol (CH_3OH) to determine the limiting reagent.

MW $C_7H_6O_3$ = 138.12 g/mol MW CH_3OH = 32.042 g/mol
MW $C_8H_8O_3$ = 152.15 g/mol

Assume an excess of CH_3OH

$$(1.50\ g\ C_7H_6O_3)\left(\frac{1\ mol\ C_7H_6O_3}{138.12\ g\ MW\ C_7H_6O_3}\right)\left(\frac{1\ mol\ C_8H_8O_3}{1\ mol\ C_7H_6O_3}\right) = 1.086\times 10^{-2}\ mol\ C_8H_8O_3$$

$$1.086\ mol\ C_8H_8O_3\left(\frac{152.15\ g\ C_8H_8O_3}{1\ mol\ C_8H_8O_3}\right) = 1.652\ g\ C_8H_8O_3$$

Assume an excess of $C_7H_6O_3$

$$(11.20\ g\ CH_3OH)\left(\frac{1\ mol\ CH_3OH}{32.042\ g\ MW\ CH_3OH}\right)\left(\frac{1\ mol\ C_8H_8O_3}{1\ mol\ CH_3OH}\right) = 0.3495\ mol\ C_8H_8O_3$$

$$0.3495\ mol\ C_8H_8O_3\left(\frac{152.15\ g\ C_8H_8O_3}{1\ mol\ C_8H_8O_3}\right) = 53.183\ g\ C_8H_8O_3$$

$C_7H_6O_3$ is the limiting reagent. For an actual yield of 1.31 g the percent yield is:

$$Percent\ Yield = \frac{1.31}{1.652}\times 100 = 79.3\%$$