

PERCENT YIELD CALCULATIONS

THE PERCENT YIELD FOR THE RXN

$\text{PCl}_3 + \text{Cl}_2 \rightarrow \text{PCl}_5$
 IS 83.2%. WHAT MASS OF PCl_5 IS EXPECTED FROM THE REACTION OF 73.7g PCl_3 WITH EXCESS CHLORINE?

FIRST, YOU NEED TO KNOW THAT WHEN A PROBLEM SAYS "EXCESS" AMOUNT OF A REAGENT, IT MEANS THERE IS ENOUGH OF IT TO PRODUCE AS MUCH OF THE PRODUCT AS YOU CAN GIVEN THE CONSTRAINTS GIVEN BY THE PROBLEM (73.7g PCl_3). IN OTHER WORDS, IT GIVES YOU A HINT AS TO THE LIMITING REAGENT... WHATEVER IS NOT IN EXCESS.

THUS THE LIMITING REACTANT MUST BE PCl_3 SO WE ONLY HAVE TO SET UP A THEORETICAL YIELD W/IT ANALYSIS FOR THIS LIMITING REACTANT.

GIVEN

73.7g PCl_3
 XS Cl_2 (HOW WE WRITE "EXCESS")
 % YIELD = 83.2%

FIND

ACTUAL YIELD
 OF PCl_5 IN g.
 THEORETICAL YIELD
 OF PCl_5 IN g

YOU ALSO NEED TO KNOW THE FORMULA FOR % YIELD:

$$\frac{\text{ACTUAL}}{\text{THEORETICAL}} \times 100\% = \% \text{ YIELD}$$

ACTUAL AND EXPERIMENTAL YIELD ARE SYNONYMS, THEY MEAN THE SAME THING.

I REMEMBER THIS FORMULA AS "AIRPLANES OVER TRAINS":

$$\frac{\text{AIRPLANE}}{\text{TRAIN}} \times 100\%$$

AIRPLANE AND ACTUAL START WITH A, AND THEORETICAL AND TRAIN START WITH T. THEN ALL YOU HAVE TO REMEMBER IS AIRPLANES FLY OVER TRAINS, WHICH RUN ON THE GROUND.

BACK TO THE PROBLEM: FIRST FIND THE THEORETICAL YIELD IN g.

#6 ACTUAL YIELD = 6.02g $MgCl_2$

#7 ACTUAL YIELD = 3.01g $NaNO_3$, 5.07g $AgCl$

#8 WHAT WOULD ACTUAL YIELD BE IF % YIELD OF BOTH WATER AND Na_2SO_4 WERE 95%?

$$H_2O: \frac{\text{ACTUAL}}{1.16g H_2O} \times 100\% = 95\%$$

$$\text{ACTUAL} = 1.10g H_2O$$

$$Na_2SO_4: \frac{\text{ACTUAL}}{7.68g Na_2SO_4} \times 100 = 95\%$$

$$\text{ACTUAL} = 7.30g Na_2SO_4$$