Stoichiometry

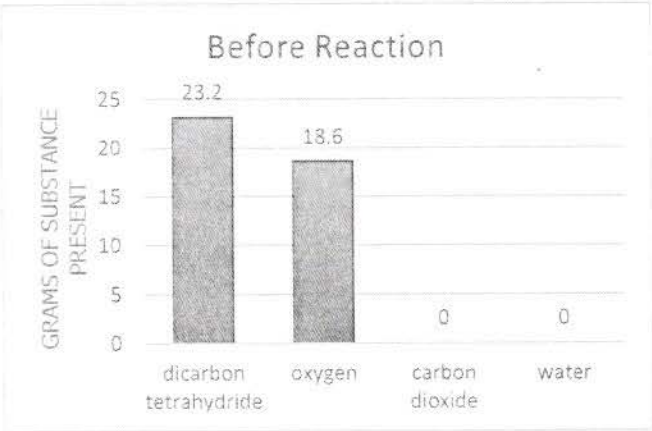
Unit 8

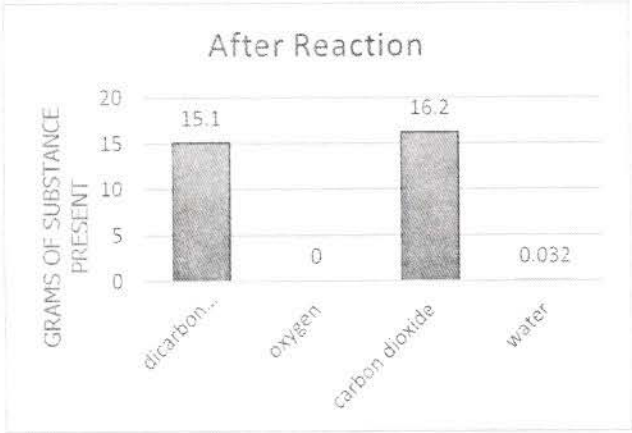
Practice Free Response 2

Directions: The suggested time is about 15 minutes for answering the constructed response section of the chemistry test. The parts within a question may not have equal weight. For calculations, show all your work in the spaces provided after each part. Pay particular attention to the proper use of units. Be sure your final answer is rounded to the correct number of significant figures. Make sure your work is legible. Illegible work will receive a grade of zero.

Question 1 [4 POINTS]

In a lab experiment, Skylar completes the combustion of 23.2 g of dicarbon tetrahydride in the presence of 18.6 g of oxygen. Her data can be seen in the graphs below.





A. Write and balance the equation for this reaction. **[3 POINTS]**

$C_2H_4 + 3O_2 \rightarrow 2CO_2 + 2H_2O$

B. Which substance is the limiting reactant? How do you know? **[2 POINTS]**

Oxygen is limiting. There is no oxygen left after the reaction because it was all used up, making it the limiting reactant.

C. Which substance is the excess reactant? How do you know? **[2 POINTS]**

C_2H_4 was left over at the end of the reaction, meaning it was excess.

CONTINUED ON REVERSE SIDE ☞

D. What is the theoretical yield, in grams, of carbon dioxide for Skylar's experiment? **[1 POINT]**

$$18.6\ g\ O_2 \times \frac{1\ mol\ O_2}{32.00\ g\ O_2} \times \frac{2\ mol\ CO_2}{3\ mol\ O_2} \times \frac{44.01\ g\ CO_2}{1\ mol\ CO_2} = \boxed{17.1\ g\ CO_2}$$

E. Skylar's twin, Ella, tries to replicate Skylar's reaction of 23.2 g of dicarbon tetrahydride with 18.6 g of oxygen. However, when Ella does it, only 0.21 **moles** of carbon dioxide are formed. What is Ella's percent yield? **[2 POINTS]**

actual

$$17.1\ g\ CO_2 \times \frac{1\ mol\ CO_2}{44.01\ g\ CO_2} = 0.389\ mol\ CO_2$$

theoretical

$$\%\ Yield = \frac{0.21\ mol\ CO_2}{0.389\ mol\ CO_2} \times 100 = \boxed{54\%\ yield\ of\ CO_2}$$