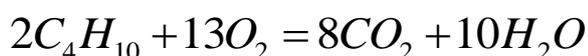## Answer on Question #83621 – Chemistry – Organic Chemistry

Task:

In the reaction C_4H_{10} + O_2 = CO_2 + H_2O, 172.5 g of C_4H_{10} reacts with excess O_2. How many grams of CO_2 will be produced?

Solution:

Chemical reaction equation:

$$2C_4H_{10} + 13O_2 = 8CO_2 + 10H_2O$$

According to the chemical reaction equation:

$$\frac{n(C_4H_{10})}{2} = \frac{n(CO_2)}{8}; \quad \Rightarrow \quad n(C_4H_{10}) = \frac{n(CO_2)}{4}$$

Then,

$$M(C_4H_{10}) = 4*Ar(C) + 10*Ar(H) = 4*12 + 10*1 = 58\,{}^{g}\!/_{mol};$$

$$M(CO_2) = Ar(C) + 2*Ar(O) = 12 + 2*16 = 44\,{}^{g}\!/_{mol};$$

$$n(X) = \frac{m(X)}{M(X)};$$

$$\frac{m(C_4H_{10})}{M(C_4H_{10})} = \frac{m(CO_2)}{4*M(CO_2)};$$

$$m(CO_2) = \frac{4*M(CO_2)*m(C_4H_{10})}{M(C_4H_{10})};$$

$$m(CO_2) = \frac{4*44\,{}^{g}\!/_{mol}*172.5\,g}{58\,{}^{g}\!/_{mol}} = 523.448\,g;$$

$$m(CO_2) = 523.448\,g$$

Answer: 523.448 grams of CO_2 will be produced.