Answer on Question #65317 - Chemistry – Other
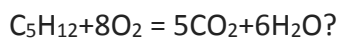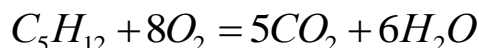
Task:

How many grams of oxygen react with 72.0 grams of C_5H_{12} by using this equation:
$C_5H_{12}+8O_2 = 5CO_2+6H_2O$?

Solution:

Reaction equation:

$$C_5H_{12} + 8O_2 = 5CO_2 + 6H_2O$$

We find the amount of pentane (C_5H_{12}):

$$M(C_5H_{12}) = 5 \times Ar(C) + 12 \times Ar(H) = 5 \times 12 + 12 \times 1 = 60 + 12 = 72\,(g/mol);$$

$$n(C_5H_{12}) = \frac{m(C_5H_{12})}{M(C_5H_{12})} = \frac{72.0\,g}{72\,{g}/{mol}} = 1\,mol\,of\,C_5H_{12}.$$

$$72\,grams\,of\,pen\tan e = 1\,mol$$

By reaction equation:

$$n(C_5H_{12}) = \frac{n(O_2)}{8}; \quad \Rightarrow \quad n(O_2) = 8 \times n(C_5H_{12});$$

We find the mass of oxygen (O_2):

$$M(O_2) = 2 \times Ar(O) = 2 \times 16 = 32\,(g/mol);$$

$$m(O_2) = n(O_2) \times M(O_2) = 8 \times n(C_5H_{12}) \times M(O_2) = 8 \times 1 \times 32 = 256\,grams\,of\,O_2$$

Answer: 256 grams of oxygen react with 72.0 grams of C_5H_{12}.