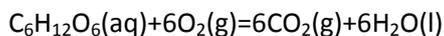


Answer on Question #40480, Chemistry, Other

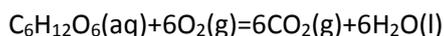
Task:

Glucose, $C_6H_{12}O_6$, is used as an energy source for the human body. The overall reaction in the body is described by the equation:



Calculate the number of grams of oxygen, required to convert 43.0 g of glucose to CO_2 and H_2O . Also compute the number of grams of CO_2 produced.

Answer:



$$v = \frac{m}{M}$$

where m-mass, grams;

M-molar mass, gram/mol.

$$M(C_6H_{12}O_6) = 180 \text{ g/mol}$$

$$v(C_6H_{12}O_6) = \frac{43.0}{180} = 0.24 \text{ moles}$$

The amount of moles of O_2 is 6 times greater, than that of $C_6H_{12}O_6$:

$$v(O_2) = 6 \cdot v(C_6H_{12}O_6) = 6 \cdot 0.24 = 1.44 \text{ moles}$$

$$m(O_2) = v(O_2) \cdot M(O_2)$$

$$M(O_2) = 32 \text{ g/mol}$$

That is why the mass of O_2 is equal to:

$$m(O_2) = 1.44 \cdot 32.0 = 46.1 \text{ g}$$

$$v(CO_2) = v(O_2) = 6 \cdot v(C_6H_{12}O_6) = 6 \cdot 0.24 = 1.44 \text{ moles}$$

$$m(CO_2) = v(CO_2) \cdot M(CO_2)$$

$$M(CO_2) = 44.0 \text{ g/mol}$$

That is why the mass of CO_2 is equal to:

$$m(CO_2) = 1.44 \cdot 44.0 = 63.4 \text{ g}$$