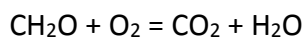


Answer on the Question #65735, Chemistry / Inorganic chemistry

The density of a wood is 0.79g/cm³. If the empirical formula of wood is CH₂O. Calculate the mass of water produced when a log of dimension 12cm * 14cm * 25cm is burnt completely.

Solution:

Reaction of the wood combustion:



The mass of the wood is a composition of the density and volume of the piece of wood:

$$m(\text{CH}_2\text{O}) = d(\text{CH}_2\text{O}) \cdot V(\text{CH}_2\text{O})$$

$$V(\text{CH}_2\text{O}) = a \cdot b \cdot c = 12 \text{ cm} \cdot 14 \text{ cm} \cdot 25 \text{ cm} = 4200 \text{ cm}^3$$

$$m(\text{CH}_2\text{O}) = 0.79 \frac{\text{g}}{\text{cm}^3} \cdot 4200 \text{ cm}^3 = 3318 \text{ g}$$

The mole number of the wood equal to the mole number of the water (by the reaction):

$$n(\text{CH}_2\text{O}) = n(\text{H}_2\text{O})$$

$$n(\text{CH}_2\text{O}) = \frac{m(\text{CH}_2\text{O})}{M(\text{CH}_2\text{O})} = \frac{3318 \text{ g}}{30 \text{ g/mol}} = 110,6 \text{ mol}$$

$$m(\text{H}_2\text{O}) = n(\text{H}_2\text{O}) \cdot M(\text{H}_2\text{O}) = 110.6 \text{ mol} \cdot 18 \frac{\text{g}}{\text{mol}} = 1990.8 \text{ g}$$

Answer: the 1990.8 g of the water produced.