

Answer on Question #69907 – Chemistry – Organic Chemistry

Question:

A 30cm³ sample of butane, C₄H₁₀, was completely reacted in a limited supply of oxygen to produce 60 cm³ of carbon dioxide and 60 cm³ of carbon monoxide.

All volumes were measured at room temperature and pressure.

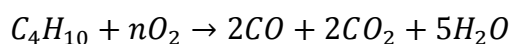
Which volume of oxygen was used?

Solution:

Unbalanced equation of reaction is as follows:

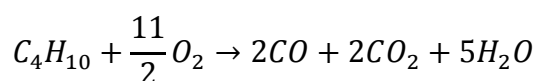


Let's balance it taking into account the fact that volumes of produced gases, carbon dioxide and carbon monoxide, are equal and thus their quantities (in numbers of molecules) are equal:



(Here numbers 2 preceding CO and CO₂ are chosen to balance Carbon, and number 5 preceding H₂O is chosen to balance Hydrogen.)

The unknown n satisfies $2n = 2 + 2 \times 2 + 5$, hence $n = \frac{11}{2}$. Thus,



The volume of oxygen used is $\frac{11}{4}$ greater than volume of CO or CO₂ produced:

$$V = \frac{11}{2} \times \frac{60\text{cm}^3}{2} = 165\text{cm}^3.$$

Answer:

165cm³.

Answer provided by <https://www.AssignmentExpert.com>