

Answer on Question #55545 - Chemistry - General chemistry

Question:

1. If the fuel has a density of 0.782 g/ml, how many grams of H₂O and CO₂ is produced in reducing 500 milliliters of the fuel?
2. At STP, find the volume of CO₂ that are produced in question number 1.

Solution:

1. Fuel with density of 0.782 g/ml has to be a gasoline. It is known that the main component of gasoline is octane C₈H₁₈. Based on this, we can estimate the following burning reaction:



$$m_{\text{C}_8\text{H}_{18}} = 0.782 \text{ g/ml} \times 500 \text{ ml} = 391 \text{ g}$$

$$n_{\text{C}_8\text{H}_{18}} = 391 \text{ g} / 114.224 \text{ g/mol} = 3.423 \text{ mol}$$

$$m_{\text{CO}_2} = 8 n_{\text{C}_8\text{H}_{18}} \times M_{\text{CO}_2} = 27.385 \text{ mol} \times 44 \text{ g/mol} = 1205 \text{ g}$$

$$m_{\text{H}_2\text{O}} = 9 n_{\text{C}_8\text{H}_{18}} \times M_{\text{H}_2\text{O}} = 30.808 \text{ mol} \times 18 \text{ g/mol} = 555 \text{ g}$$

2. $V_{\text{CO}_2} = V_m \times 8 n_{\text{C}_8\text{H}_{18}} = 27.385 \text{ mol} \times 22.4 \text{ L/mol} = 613.4 \text{ L}$