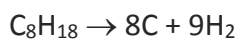


Answer on Question #79489, Chemistry/ General Chemistry

the mass of carbon produced by 1 tonne of octane

Solution

Decomposition of octane under certain conditions leads to formation of carbon and hydrogen:



$$n = m/M$$

$$M(\text{C}_8\text{H}_{18}) = 12 \times 8 + 1 \times 18 = 114 \text{ (g/mol)}$$

$$n(\text{C}_8\text{H}_{18}) = \frac{1 \times 10^6 \text{ g}}{114 \frac{\text{g}}{\text{mol}}} = 8772 \text{ mol}$$

According to equation mole ratio $n(\text{C}_8\text{H}_{18}) : n(\text{C}) = 1:8$, then $n(\text{C}) = 8 \times n(\text{C}_8\text{H}_{18})$;

$$n(\text{C}) = 8772 \text{ mol} \times 8 = 70176 \text{ mol}$$

$$m(\text{C}) = M \times n$$

$$m(\text{C}) = 12 \text{ g/mol} \times 70176 \text{ mol} = 842112 \text{ g} \cong 0.84 \text{ tons}$$

Answer: 0.84 tons

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