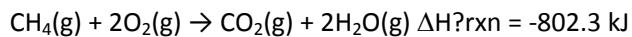


Answer on Question #40878 - Chemistry – Other

Question

How much heat is produced by the complete combustion of 265g of CH₄?



Answer:

$\Delta H^\circ_{\text{rxn}} = -802.3 \text{ kJ}$ means that 802.3 kJ of heat are produced by the complete combustion of 1 mol of methane. So we should calculate the number of moles of methane to find out the amount of heat produced by this reaction.

Number of moles equals:

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

m – Mass of the methane, m = 265 g.

M – Molar mass of methane, g/mol:

$$M(\text{CH}_4) = M(\text{C}) + 4M(\text{H}) = 12 + 4 \cdot 1 = 16 \text{ g/mol}$$

Then number of moles of methane is:

$$n(\text{CH}_4) = \frac{m(\text{CH}_4)}{M(\text{CH}_4)} = \frac{265}{16} = 16.6 \text{ mol}$$

Then we make a proportion:

Combustion of 1 mol of CH₄ produces 802.3 kJ of heat

Combustion of 16.6 mol of CH₄ – x kJ of heat

$$x = \frac{16.6 \cdot 802.3}{1} = 13318.2 \text{ kJ}$$

Answer: 13318.2 kJ of heat are produced by the complete combustion of 265 g of CH₄.