

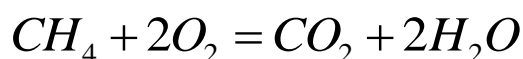
Answer on Question #71306 – Chemistry – Other

Task:

Calculate the standard enthalpy of combustion of methane. Given that standard enthalpy of carbon and hydrogen are -393.5 kJ/mol and -283.83 kJ/mol. Standard enthalpy of formation of methane, is -75.16 kJ/mol?

Solution:

Write the equation and balance the reaction of combustion of methane:



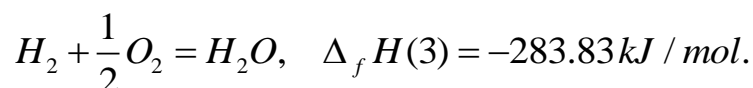
Write the equation and balance the reaction of formation of methane:



Write the equation and balance the reaction of combustion of carbon:



Write the equation and balance the reaction of combustion of hydrogen:



The calculation for the heat of combustion for methane using Hess's law:

$$\text{Heat of reaction} = \Delta_c H = -\Delta_f H(1) + \Delta_f H(2) + 2 * \Delta_f H(3)$$

$$\text{Heat of combustion} = \Delta_c H(CH_4) = 75.16 - 393.5 + 2 * (-283.83) = -886 \text{ kJ / mol}$$

So, the heat of combustion, that is, the heat of reaction, is - 886 kJ per mole of methane.

Answer: The standard enthalpy of combustion of methane is -886 kJ/mol.

