

Thermochemical equations – combustion reactions stoichiometry – determining ΔH

Lesson 4

- 1) a) Write a balanced chemical equation for the complete combustion of liquid butane(C_4H_{10}) in oxygen gas, where the products are a gas and a liquid.

b) An investigation was conducted to find the ΔH for the reaction represented by the equation above. Calculate the experimental value of the ΔH of the equation a) above if 0.580 grams of pure butane generated 28.9 kJ of heat energy.

c) Calculate the mass of carbon dioxide produced if an unknown mass of butane delivered 3.10×10^3 kJ of energy.

- 2) Propane gas undergoes complete combustion in excess oxygen gas to produce gaseous products.

a) Write a balanced chemical equation for the combustion reaction.

b) If 120.0 g of pure propane generated 6.05×10^3 kJ of heat energy, find the ΔH for the equation for the combustion reaction above.

c) What mass of water is produced from the reaction represented by the equation above if 6.60 kJ of energy is produced?

3) A student conducted an experiment to determine the molar heat of combustion for the complete combustion of ethanol .

a) If 9.20 grams of pure ethanol generated 273.4 kJ of heat energy, write the balanced thermochemical equation, including states for this reaction where a gas and a liquid are formed as products.

b) What mass of carbon dioxide is produced from the reaction represented by the equation in a) above if 1.37kJ of energy is produced?

c) Given that the density of ethanol is 0.7854 g/mL, calculate the volume of ethanol required to produce 54.8 kJ of energy when it burns in oxygen according to the equation in a) above.