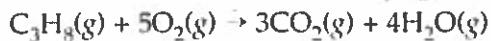


23-2 Apply

Barbecuing with Enthalpy

Adrian is cooking hamburgers on an outdoor propane-burning grill. From chemistry class, he knows that the reaction of propane (C_3H_8) with oxygen is written as



Adrian also knows that the change in enthalpy for this reaction is

$$\Delta H^\circ = -2043 \text{ kJ}$$

Answer each of the following questions about Adrian's barbecue in the space provided.

- The second equation above assumes that the reactants in the first equation consist of 1 mole of C_3H_8 and 5 moles of O_2 , and that the products consist of 3 moles of CO_2 and 4 moles of H_2O . If you double the number of moles of reactants and let the reaction proceed to completion, what is the enthalpy change for the new reaction? Explain your answer.

- Can you determine, from the sign of ΔH° , whether the reaction is endothermic or exothermic? If you did not know the value of ΔH° , what other evidence would help you determine whether this reaction is endothermic or exothermic? Explain your answers.

- What is the value of ΔH° for the reaction of water and carbon dioxide to form propane and oxygen? Is this reaction spontaneous or nonspontaneous? Is it exothermic or endothermic? Explain your answers.

- Complete the enthalpy diagram to the right for the reaction that Adrian is using to cook his hamburgers.

