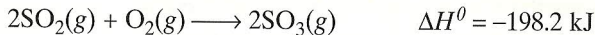
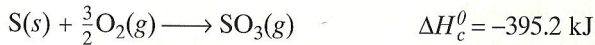


PRACTICE*Answers in Appendix E*

1. Calculate the enthalpy of formation of butane, C_4H_{10} , using the balanced chemical equation and information in Appendix Table A-5 and Table A-14. Write out the solution according to Hess's law.
2. Calculate the enthalpy of combustion of 1 mol of nitrogen, N_2 , to form NO_2 using the balanced chemical equation and Appendix Table A-14.
3. Calculate the enthalpy of formation for sulfur dioxide, SO_2 , from its elements, sulfur and oxygen. Use the balanced chemical equation and the following information.



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SECTION REVIEW

1. What kind of enthalpy change favors a spontaneous reaction?
2. What is entropy, and how does it relate to spontaneity of reactions?
3. List several changes that result in an entropy increase.
4. Define *free energy*, and explain how its change is calculated.
5. Explain the relationship between free-energy change and spontaneity of reactions.

6. In the reaction in Sample Problem D, why does the entropy increase?

Critical Thinking

7. **APPLYING MODELS** Most biological enzymes become denatured when they are heated and lose their ability to catalyze reactions. This process (original enzyme \longrightarrow denatured enzyme) is endothermic and spontaneous. Which structure, the original enzyme or the denatured enzyme, is more ordered? Explain your reasoning using thermodynamic concepts.