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CHAPTER 16 STUDY GUIDE FOR CONTENT MASTERY

Section 16.3 Thermochemical Equations

In your textbook, read about writing thermochemical equations and about changes of state.

Use the following terms to complete the statements. Some terms will be used more than once.

thermochemical equation	enthalpy of combustion	released
molar enthalpy of vaporization	molar enthalpy of fusion	absorbs
cool	heat	

1. A(n) thermochemical equation is a balanced chemical equation that includes the physical states of all reactants and products and the energy change that accompanies the reaction.
2. The enthalpy change for the complete burning of one mole of a substance is the enthalpy of combustion.
3. The molar enthalpy of vaporization is the heat required to vaporize one mole of a liquid.
4. The molar enthalpy of fusion is the heat required to melt one mole of a solid substance.
5. Converting two moles of a liquid to a solid requires an amount of energy that is twice the molar enthalpy of fusion.
6. $2H_2(g) + O_2(g) \rightarrow 2H_2O(g) \quad \Delta H = -572$ kJ is a(n) thermochemical equation.
7. The conversion of a gas to a liquid involves the molar enthalpy of vaporization.
8. When a gas condenses to a liquid, heat is released to the surroundings.
9. Sweating makes you feel cooler because, as it evaporates, the water on your skin absorbs heat from your body.
10. If you put an ice cube in a glass of soda pop, the heat absorbed by the ice will cause the ice to melt, and the soda pop will become cool.
11. If it takes 100 joules to melt a piece of ice, heat must be absorbed by the ice.
12. In the equation $H_2O(s) \rightarrow H_2O(l) \quad \Delta H = 600$ kJ, the positive value for ΔH means that heat is absorbed in the reaction.

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CHAPTER 16 STUDY GUIDE FOR CONTENT MASTERY

Section 16.5 Reaction Spontaneity

In your textbook, read about spontaneous processes and about entropy, the universe, and free energy.

Use each of the terms below to complete the statements.

spontaneous process	entropy	law of disorder	free energy

1. A(n) spontaneous process is a physical or chemical change that occurs with no outside intervention.
2. A measure of disorder or randomness of the particles that make up a system is called entropy.
3. The law of disorder states that spontaneous processes always proceed in such a way that the entropy of the universe increases.
4. Free energy is the energy that is available to do work.

For each statement below, write *true* or *false*.

false 5. A process cannot be spontaneous if it is exothermic and there is an increase in disorder.

true 6. A process cannot be spontaneous if it is endothermic and there is a decrease in disorder.

false 7. A process cannot be spontaneous if it is exothermic and there is a decrease in disorder as long as the temperature remains low.

false 8. A process cannot be spontaneous if it is endothermic and there is an increase in disorder as long as the temperature remains high.

false 9. A process can never be spontaneous if the entropy of the universe increases.

true 10. When ΔG for a reaction is negative, the reaction is spontaneous.

true 11. When ΔG for a reaction is positive, the reaction is not spontaneous.

false 12. When ΔH for a reaction is negative, the reaction is never spontaneous.

true 13. When ΔH for a reaction is large and positive, the reaction is not expected to be spontaneous.