Name _____ Date _____ Class _____

CHAPTER 16 CHAPTER ASSESSMENT

Energy and Chemical Change

Reviewing Vocabulary

Match the definition in Column A with the term in Column B.

	Column A	Column B
h	1. The ability to do work or produce heat	a. calorimeter
e	2. States that energy cannot be created or destroyed	b. standard enthalpy (heat) of formation
d	3. Energy flowing from a warmer to a cooler object	c. chemical potential energy
p	4. The study of heat changes from chemical reactions and phase changes	d. heat
c	5. Energy stored in a substance because of its composition	e. law of conservation of energy
f	6. Heat required to raise the temperature of one gram of a substance by one degree Celsius	f. specific heat
a	7. An insulated device measuring the heat absorbed or released during a chemical or physical process	g. free energy
r	8. The system plus the surroundings	h. energy
m	9. States that spontaneous processes always proceed in such a way that the entropy of the universe increases	i. thermochemical equation
t	10. Everything in the universe other than the system	j. enthalpy (heat) of reaction
j	11. The change in enthalpy in a chemical reaction	k. molar enthalpy (heat) of fusion
i	12. A balanced chemical equation that includes the physical states of all reactants and products and the energy change that accompanies the reaction	l. molar enthalpy (heat) of vaporization
s	13. A system's heat content at constant pressure	m. law of disorder
l	14. Energy required to vaporize one mole of a liquid	n. spontaneous process
u	15. Enthalpy change occurring when one mole of a compound in its standard state forms from its constituent elements in their standard states	o. joule
k	16. Energy required to melt one mole of a solid	p. thermochemistry
n	17. A physical or chemical change without outside intervention	q. enthalpy (heat) of combustion
q	18. The enthalpy change for the complete burning of one mole of a substance	r. universe
g	19. Energy that is available to do work	s. enthalpy
o	20. The SI unit of heat and energy	t. surroundings

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CHAPTER 16 CHAPTER ASSESSMENT

Understanding Main Ideas (Part A)

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

true 1. A negative sign for ΔG indicates that, at constant temperature and pressure, the reaction is spontaneous.

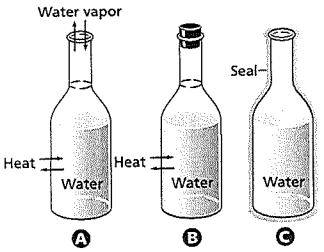
false 2. For a given substance, the entropy always increases in the following order: gas → liquid → solid.

false 3. For the reaction $NH_4Cl(s) \rightarrow NH_3(g) + HCl(g)$, the entropy change is negative.

true 4. Hess's law states that if two or more thermochemical equations can be added to produce a final equation for a reaction, then the sum of all the enthalpy changes for the individual reactions is the enthalpy change for the final reaction.

Use the illustration of three systems to answer the following questions.

5. How do the bottles in the three systems differ?
The bottle in system A is open. The bottle in system B is stoppered. The bottle in system C is sealed.



6. What do the arrows in the illustration indicate?
The arrows indicate that both heat and water vapor can be added to or removed from system A. In system B, the stopper prevents water vapor from entering or leaving the bottle, so only heat can be added to or removed from the system. No arrows point to or from system C. Because of the seal around system C, neither heat nor water vapor can be added to or removed from system C.

7. Which of the systems will show the greatest change in enthalpy and entropy as time progresses? Which will show the least change? Explain your answers.
System A will show the greatest change because both heat and water vapor can enter or leave the bottle. System C will show the least change because neither heat nor water vapor can enter or leave the bottle.

8. What are the surroundings in the illustration?
The surroundings are the bottles and all things outside the bottles.