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17.3

HEAT IN CHANGES OF STATE

Section Review

Objectives

- Classify, by type, the enthalpy changes that occur during melting, freezing, boiling, and condensing
- Calculate the enthalpy changes that occur during melting, freezing, boiling, and condensing
- Explain what thermochemical changes can occur when a solution forms

Vocabulary

- molar heat of fusion
- molar heat of condensation
- molar heat of solidification
- molar heat of solution
- molar heat of vaporization

Part A Completion

Use this completion exercise to check your understanding of the concepts and terms that are introduced in this section. Each blank can be completed with a term, short phrase, or number.

The heat absorbed by 1 mole of a substance in melting from	1
a solid to a liquid at a constant temperature is called the <u>1</u> .	2
The heat lost when 1 mole of a liquid solidifies at a constant	3
temperature is called the <u>2</u> . The quantity of heat absorbed	4
by a melting solid is <u>3</u> to the quantity of heat lost when the	5
liquid solidifies. The heat of fusion for methanol is <u>4</u> .	6
When liquids absorb heat at their boiling points, they become	7
vapors. The amount of heat necessary to vaporize one mole of a	
given liquid is called its <u>5</u> . <u>6</u> is the exact opposite of	

vaporization. The amount of heat released when one mole of vapor

condenses is called its <u>7</u>.

Part B True-False

Classify each of these statements as always true, AT; sometimes true, ST; or never true, NT.

8. ΔH_{fus} = - ΔH_{solid}
9. Melting and vaporization are exothermic processes.
10. In order to convert 1 mole of H₂O(*l*) to 1 mol of H₂O(*g*), 40.7 kJ must be supplied.
11. When ice melts, the temperature of the ice increases until the entire sample becomes liquid.
12. When ammonium nitrate dissolves in water, the solution gets cold. This is an example of an exothermic reaction.

Part C Matching

Match each description in Column B to the correct term in Column A.

	Column A		Column B
13.	molar heat of fusion	a.	the heat absorbed by 1 mole of a substance in melting from a solid to a liquid
14.	molar heat of solidification	b.	the amount of heat necessary to vaporize 1 mole of a liquid
15.	molar heat of vaporization	c.	$= -\Delta H_{\rm cond}$
16.	$\Delta H_{ m vap}$	d.	the heat change caused by dissolution of 1 mole of substance
17.	molar heat of solution	e.	the heat lost when 1 mole of a liquid solidifies at a constant temperature

Part D Questions and Problems

Answer the following in the space provided.

18. State whether the following physical and chemical changes are endothermic or exothermic.

a. melting	d. fusion
b. vaporization	e. freezing
c. condensation	f. combustion

19. How much heat is absorbed when 28.3 g of $H_2O(s)$ at 0°C is converted to liquid at 0°C?

20. How much heat is absorbed when 5.53 mol of NH_4NO_3 solid is dissolved in water? ($\Delta H_{soln} = 25.7 \text{ kJ/mol}$)

Name _____