.....

Column B

17

THERMOCHEMISTRY

Chapter Test B

A. Matching

Match the correct vocabulary term to each numbered statement. Write the letter of the correct term on the line.

Column A

 1.	the accurate and precise measurement of heat flow for chemical and physical processes	a.	thermochemical equation
 2.	the heat of reaction for the complete burning of 1 mole of a substance	b.	joule
 3.	the study of the heat transfers that occur during chemical reactions and physical changes of state	c.	endothermic process
 4.	a process that absorbs heat from the surroundings	d.	Hess's law of heat summation
 5.	the heat content of a substance	e.	chemical potential energy
 6.	If two or more thermochemical equations are added to give a final equation, their heat changes can be added to determine the final heat change.	f.	heat of combustion
 7.	the energy stored in the chemical bonds of a substance	g.	calorimetry
 8.	the heat absorbed by 1 mole of a substance in melting from a solid to a liquid at a constant temperature	h.	thermochemistry
 9.	the SI unit of energy	i.	molar heat of fusion
 10.	a chemical equation that includes the enthalpy change	j.	enthalpy

B. Multiple Choice

Choose the best answer and write its letter on the line.

11.	11. The quantity of heat that raises the temperature of 1 gr					
	water 1°C is					
	a. heat capacity.	c. a calorie.				
	• • •					

b. joule.

d. heat of combustion.

Name _		I	Date	Class		
	12.	The amount of heat required t	o change the temperature	of an object		
		by exactly 1°C is the object's	0 1	,		
		a. heat of combustion.	c. enthalpy.			
		b. heat capacity.	d. heat of forma	ation.		
	13.	The number of calories requir water from 25°C to 45°C is	ed to raise the temperatur	e of 55.0 g of		
		a. 1.10×10^3 cal.	c. 2480 cal.			
		b. 1380 cal.	d. 55.0 cal.			
	14.	If 1 Calorie = 4.18 kJ, how man banana containing 150 Cal?	ased by a			
		a. 6.3×10^5 kJ	c. 36 kJ			
		b. 0.028 kJ	d. 630 kJ			
	15.	5. The temperature of an 8.0-g sample of metal changed from 25°C to 50°C when it absorbed 420 J of heat. What is the specific heat of this sample?				
		a. 130 J/g•°C	c. 1300 J/g•°C			
		b. 2.1 J/g•°C	d. 0.48 J/g•°C			
	16.	6. As perspiration evaporates from your skin, your body is cooled respect to your body, this process is said to be				
		a and othermic	e isothormic			
		b. exothermic.	d. none of the a	bove.		
	17.	A student mixes two water sol final solution with a mass of 5 in kJ, for this reaction?	to form a heat change,			
		a. 37.3 kJ	c. 27.2 kJ			
		b. 242 kJ	d. 1.58 kJ			
	18.	Given the equation $I_2(s) + 62.4 \text{ kJ} \rightarrow I_2(g)$, which of the following is true?				
		a. The reaction is exothermic b. $\Delta H = \pm 62.4$ kI				
		c. $\Delta H = -62.4 \text{ kJ}$				
		d. The reaction releases heat.				
	19.	Given the equation in question production of 3.5 mol $I_2(g)$?	n 18, how much heat is inv	volved in the		
		a. 110 kJ	c. 220 kJ			
		b. 62 kJ	d. 3.5 kJ			
	20.	Given the equation $C_3H_8(g)$ + how much heat is produced w	$5O_2(g) \rightarrow 3CO_2(g) + 4H_2O$ hen 80.0 g of O_2 react?	(g) + 2220 kJ,		
		a. 1110 kJ	c. 2.50 kJ			
		D. $5.55 \times 10^{\circ}$ KJ	a. 1.78×10^{3} kJ			
	21.	Which of the following statem	ents is true?			
		a. $\Delta H_{\rm vap} = \Delta H_{\rm cond}$	c. $\Delta H_{\rm vap}$ is alwa	ys negative.		
		D. $\Delta H_{\rm vap} = -\Delta H_{\rm cond}$	d. ΔH_{cond} is alw	ays positive.		

Name	Date		Class			
22.	• How much heat, in kJ, is released when 108 g of water at 0°C freezes to					
	ice at 0°C if ΔH_{solid} for water = -6.01 kJ/mol?					
	a. 18.0 kJ	c. 649 kJ				
	b. 6.00 kJ	d. 36.1 kJ				
23.	How much heat is released in the condensation of 27.0 g of steam at					
	100°C to water at 100°C if ΔH_{cond} for water = -40.7 kJ/mol?					
	a. 1.51 kJ	c. 61.0 kJ				
	b. $1.10 \ 3 \ 10^3 \ \text{kJ}$	d. 27.1 kJ				
24.	If the molar heat of solution of NaOH is -445.1 kJ/mol, how much					
	heat (in kJ) will be released if 80.00 g of NaOH are dissolved in water?					
	a. 22.6 kJ	c. 5.564 kJ				
	b. 890.2 kJ	d. 35610 kJ				
25.	Calculate the enthalpy change, ΔH in kJ, for the reaction					
	$NO(g) + \frac{1}{2}O_2(g) \rightarrow NO_2(g)$					
	Use the following:					
	$^{1}N(q) + ^{1}O(q) \rightarrow NO(q)$	$\Lambda H = \pm 00.25 \text{ kJ}$				
	$\frac{1}{2}N_2(g) + \frac{1}{2}O_2(g) \rightarrow NO(g)$	$\Delta H = \pm 90.23 \text{ KJ}$				
	$\frac{1}{2}N_2(g) + O_2(g) \rightarrow NO_2(g)$	$\Delta H = +33.18 \text{ kJ}$				
	a. −123.43 kJ	c. 57.07 kJ				
	b. +123.43 kJ	d. −57.07 kJ				

C. Essay

Write a short essay for the following.

26. Explain why a burn from steam is generally more serious than a burn from very hot water.

D. Problems

Solve the following problems in the space provided. Show your work.

27. Determine the specific heat of a material if an 18-g sample absorbed 75 J as it was heated from 15° C to 40° C.

- **28.** If 27.0 mL of water containing 0.035 mol HCl is mixed with 28.0 mL of water containing 0.035 mol NaOH in a calorimeter such that the initial temperature of each solution was 24.0°C and the final temperature of the mixture is 33.0°C, how much heat (in kJ) is released in the reaction? Assume that the densities of the solutions are 1.00 g/mL.
- **29.** Given the equation $C_2H_4(g) + 3O_2(g) \rightarrow 2CO_2(g) + 2H_2O(l) + 1411$ kJ, how much heat is released when 8.00 g of O_2 react?
- **30.** How many grams of ice at 0°C can be melted into water at 0°C by the addition of 75.0 kJ of heat? ΔH_{fus} for water = 6.01 kJ/mol
- **31.** What is the enthalpy change, ΔH in kJ, for the following reaction: $2C(s) + O_2(g) \rightarrow 2CO(g)$ Given the following: $C(s) + O_2(g) \rightarrow CO_2(g) \qquad \Delta H = -393.5 \text{ kJ}$ $2CO(g) + O_2(g) \rightarrow 2CO_2(g) \qquad \Delta H = -565.7 \text{ kJ}$
- **32.** What is the heat of reaction (ΔH) for the combustion of benzene, C₆H₆(l), to form carbon dioxide gas and water? Write the final balanced equation for the reaction.

Standard heats of formation:

 $\begin{array}{l} C_{6}H_{6}=\,+48.50~\text{kJ}\\ O_{2}(g)\,=\,0.0~\text{kJ}\\ CO_{2}(g)\,=\,-393.5~\text{kJ}\\ H_{2}O(l)\,=\,-285.8~\text{kJ} \end{array}$