CH 221 Energy / Chapter 5
Self Quiz Name: _____ Lab Section: _____

This is a sample quiz for CH 221 providing examples of energy. Answers are provided at the end of this handout. *Good luck!*

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1. Equal masses of two substances, A & B, each absorb 25 Joules of energy. If the temperature of A increases by 4 degrees and the temperature of B increases by 8 degrees, one can say that
   a) the specific heat of A is double that of B.
   b) the specific heat of B is double that of A.
   c) the specific heat of B is negative.
   d) the specific heat of B is triple that of A.

2. If 25 J are required to change the temperature of 5.0 g of substance A by 2.0°C, what is the specific heat of substance A?
   a) 250 J/g°C c) 10. J/g°C
   b) 63 J/g°C d) 2.5 J/g°C

3. How much energy is required to change the temperature of 2.00 g aluminum from 20.0°C to 25.0°C? The specific heat of aluminum is 0.902 J/g°C.
   a) 2.3 J c) 0.36 J
   b) 9.0 J d) 0.090 J

4. Consider the thermal energy transfer during a chemical process. When heat is transferred to the system, the process is said to be _____ and the sign of ΔH is _____.
   a) exothermic, positive
   b) endothermic, negative
   c) exothermic, negative
   d) endothermic, positive

5. When two solutions react the container "feels hot." Thus,
   a) the reaction is endothermic.
   b) the reaction is exothermic.
   c) the energy of the universe is increased.
   d) the energy of both the system and the surroundings is decreased.

6. The equation for the standard enthalpy of formation of N_2O_3 is
   a) $N_2O(g) + O_2(g) \rightarrow N_2O_3(g)$
   b) $N_2O_5(g) \rightarrow N_2O_3(g) + O_2(g)$
   c) $NO(g) + NO_2(g) \rightarrow N_2O_3(g)$
   d) $N_2(g) + {}^3/_2\, O_2(g) \rightarrow N_2O_3(g)$

7. For the general reaction
   $2\ A + B_2 \rightarrow 2\ AB$, ΔH is +50.0 kJ.
   We can conclude that
   a) the reaction is endothermic.
   b) the surroundings absorb energy.
   c) the standard enthalpy of formation of AB is -50.0 kJ.
   d) the molecule AB contains less energy than A or B_2.

8. Calculate the enthalpy of combustion of C_3H_6:
   $C_3H_6(g) + {}^9/_2\, O_2(g) \rightarrow 3\ CO_2 + 3\ H_2O$
   using the following data:
   $3\ C(s) + 3\ H_2(g) \rightarrow C_3H_6(g)$ $\Delta H° = 53.3$ kJ
   $C(s) + O_2(g) \rightarrow CO_2(g)$ $\Delta H° = -394$ kJ
   $H_2(g) + {}^1/_2\, O_2(g) \rightarrow H_2O(l)$ $\Delta H° = -286$ kJ
   a) -1517 kJ c) -626 kJ
   b) 1304 kJ d) -2093 kJ

9. Which one of the following would have an enthalpy of formation value (ΔH_f) of zero?
   a) $H_2O(g)$ c) $H_2O(l)$
   b) $O(g)$ d) $O_2(g)$

10. Calculate the heat of vaporization of titanium (IV) chloride: $TiCl_4(l) \rightarrow TiCl_4(g)$
    using the following enthalpies of reaction:
    $Ti(s) + 2Cl_2(g) \rightarrow TiCl_4(l)$ $\Delta H°$=-804.2 kJ
    $TiCl_4(g) \rightarrow 2Cl_2(g) + Ti(s)$ $\Delta H°$= 763.2 kJ
    a) -1567.4 kJ c) 1165.0 kJ
    b) -783.7 kJ d) 41.0 kJ

11. Calculate the enthalpy of reaction for:
    $D + F \rightarrow G + M$
    using the following equations and data:
    $G + C \rightarrow A + B$ $\Delta H° = +277$ kJ
    $C + F \rightarrow A$ $\Delta H° = +303$ kJ
    $D \rightarrow B + M$ $\Delta H° = -158$ kJ
    a) -132 kJ c) +422 kJ
    b) -422 kJ d) +132 kJ

12. Calculate the standard enthalpy of the reaction for the process
    $3\ NO(g) \rightarrow N_2O(g) + NO_2(g)$
    using the standard enthalpies of formation (in kJ/mol): NO = 90.0; N_2O = 82.1; NO_2 = 34.0
    a) -153.9 kJ c) -26.1 kJ
    b) 206.1 kJ d) 386.0 kJ

13. The standard molar enthalpy of combustion is -1277.3 kJ for the combustion of ethanol.
    $C_2H_5OH(l) + 3\ O_2(g) \rightarrow 2\ CO_2(g) + 3\ H_2O(g)$
    Calculate the standard molar enthalpy of formation for ethanol based on the following standard enthalpies of formation:
    $\Delta H°_f\ CO_2$ = -393.5 kJ/mol
    $\Delta H°_f\ H_2O$ = -241.8 kJ/mol
    a) -642.7 kJ/mol c) 235.1 kJ/mol
    b) -235.1 kJ/mol d) 642.7 kJ/mol

14. Calculate the amount of heat needed to change 25.0 g ice at 0°C to water at 0°C. The heat of fusion of H_2O = 333 J/g.
    a) 56.5 kJ c) 7.06 kJ
    b) 8.33 kJ d) 463 kJ

15. How many joules are equivalent to 37.7 cal?
    a) 9.01 J c) 1.51 J
    b) 4.184 J d) 158 J

16. What is the value for the specific heat of liquid water?
    a) 2.418 J/g°C c) 1.248 J/g°C
    b) 4.184 J/g°C d) 8.148 J/g°C

Answers:

1.	**A**	9.	**D**
2.	**D**	10.	**D**
3.	**B**	11.	**A**
4.	**D**	12.	**A**
5.	**B**	13.	**B**

6.	**D**	14.	**B**
7.	**A**	15.	**D**
8.	**D**	16.	**B**