Name: _____ **Period:** _____ **Date:** _____ **ID: A**

AP Chem Ch. 5 Study Sheet 6

Multiple Choice

Identify the choice that best completes the statement or answers the question.

1) A 5-ounce cup of raspberry yogurt contains 6.0 g of protein, 2.0 g of fat, and 26.9 g of carbohydrate. The fuel values for protein, fat, and carbohydrate are 17, 38, and 17 kJ/g, respectively. The fuel value of this cup of yogurt is _____ kJ.
   Ⓐ 640
   Ⓑ 830
   Ⓒ 600
   Ⓓ 720
   Ⓔ 72

2) The average fuel value of sugars is 17 kJ/g. A 2.0 L pitcher of sweetened Kool-Aid contains 400 g of sugar. What is the fuel value (in kJ) of a 500 mL serving of Kool-Aid? (Assume that the sugar is the only fuel source.)
   Ⓐ 4.2×10^4
   Ⓑ 1.7×10^3
   Ⓒ 1.7×10^6
   Ⓓ 1.7×10^2
   Ⓔ 17

3) At what velocity (m/s) must a 20.0 g object be moving in order to possess a kinetic energy of 1.00 J?
   Ⓐ 1.00
   Ⓑ 100×10^2
   Ⓒ 10.0
   Ⓓ 1.00×10^3
   Ⓔ 50.0

4) When a system _____, ΔE is <u>always</u> negative.
   Ⓐ absorbs heat and does work
   Ⓑ gives off heat and does work
   Ⓒ absorbs heat and has work done on it
   Ⓓ gives off heat and has work done on it
   Ⓔ none of the above is <u>always</u> negative.

5) Which one of the following is an endothermic process?
   Ⓐ ice melting
   Ⓑ water freezing
   Ⓒ boiling soup
   Ⓓ Hydrochloric acid and barium hydroxide are mixed at 25°C: the temperature increases.
   Ⓔ Both A and C

6) Which one of the following is an exothermic process?
   Ⓐ ice melting
   Ⓑ water evaporating
   Ⓒ boiling soup
   Ⓓ condensation of water vapor
   Ⓔ Ammonium thiocyanate and barium hydroxide are mixed at 25°C: the temperature drops.

7) Of the following, which one is a state function?
   Ⓐ H
   Ⓑ q
   Ⓒ w
   Ⓓ heat
   Ⓔ none of the above

8) Which of the following is a statement of the first law of thermodynamics?
   Ⓐ $E_k = \frac{1}{2}mv^2$
   Ⓑ A negative ΔH corresponds to an exothermic process.
   Ⓒ $\Delta E = E_{final} - E_{initial}$
   Ⓓ Energy lost by the system must be gained by the surroundings.
   Ⓔ 1 cal = 4.184 J (exactly)

9) The units of of heat capacity are _____.
   Ⓐ K/J or °C/J
   Ⓑ J/K or J/°C
   Ⓒ J/g-K or J/g-°C
   Ⓓ J/mol
   Ⓔ g-K/J or g-°C/J

10) The units of of specific heat are _____.
   Ⓐ K/J or °C/J
   Ⓑ J/K or J/°C
   Ⓒ J/g-K or J/g-°C
   Ⓓ J/mol
   Ⓔ g-K/J or g-°C/J

11) The British thermal unit (Btu) is commonly used in engineering applications. A Btu is defined as the amount of heat required to raise the temperature of 1 lb of water by 1°F. There are _____ joules in one Btu. 1 lb = 453.59 g; °C = (5/9)(°F - 32°); specific heat of H_2O (l) = 4.184 J/g-K.
   Ⓐ 3415
   Ⓑ 60.29
   Ⓒ 1054
   Ⓓ 5.120×10^{-3}
   Ⓔ Additional information is needed to complete the calculation.

12) A sample of calcium carbonate [$CaCO_3$ (s)] absorbs 45.5 J of heat, upon which the temperature of the sample increases from 21.1°C to 28.5°C. If the specific heat of calcium carbonate is 0.82 J/g-K, what is the mass (in grams) of the sample?
   Ⓐ 3.7
   Ⓑ 5.0
   Ⓒ 7.5
   Ⓓ 410
   Ⓔ 5.0×10^3

13) An 8.29 g sample of calcium carbonate [$CaCO_3$ (s)] absorbs 50.3 J of heat, upon which the temperature of the sample increases from 21.1°C to 28.5°C. What is the specific heat of calcium carbonate?
   Ⓐ .63
   Ⓑ .82
   Ⓒ 1.1
   Ⓓ 2.2
   Ⓔ 4.2

14) A sample of iron absorbs 67.5 J of heat, upon which the temperature of the sample increases from 21.5°C to 28.5°C. If the specific heat of iron is 0.450 J/g-K, what is the mass (in grams) of the sample?
   Ⓐ 4.3
   Ⓑ 11
   Ⓒ 21
   Ⓓ 1100
   Ⓔ 1.1×10^3

15) A 22.44 g sample of iron absorbs 180.8 J of heat, upon which the temperature of the sample increases from 21.1°C to 39.0°C. What is the specific heat of iron?
   Ⓐ 0.140
   Ⓑ 0.450
   Ⓒ 0.820
   Ⓓ 0.840
   Ⓔ 0.900

16) Which of the following is a statement of Hess's law?
   Ⓐ If a reaction is carried out in a series of steps, the ΔH for the reaction will equal the sum of the enthalpy changes for the individual steps.
   Ⓑ If a reaction is carried out in a series of steps, the ΔH for the reaction will equal the product of the enthalpy changes for the individual steps.
   Ⓒ The ΔH for a process in the forward direction is equal in magnitude and opposite in sign to the ΔH for the process in the reverse direction.
   Ⓓ The ΔH for a process in the forward direction is equal to the ΔH for the process in the reverse direction.
   Ⓔ The ΔH of a reaction depends on the physical states of the reactants and products.

17) The energy released by combustion of 1 g of a substance is called the _____ of the substance.
   Ⓐ specific heat
   Ⓑ fuel value
   Ⓒ nutritional calorie content
   Ⓓ heat capacity
   Ⓔ enthalpy

18) Fuel values of hydrocarbons increase as the H/C atomic ratio increases. Which of the following compounds has the highest fuel value?
   Ⓐ C_2H_6
   Ⓑ C_2H_4
   Ⓒ C_2H_2
   Ⓓ CH_4
   Ⓔ C_6H_6

19) The specific heat capacity of liquid water is 4.18 J/g-K. How many joules of heat are needed to raise the temperature of 5.00 g of water from 25.1°C to 65.3°C?
   Ⓐ 48.1
   Ⓑ 840
   Ⓒ 1.89×10^{3}
   Ⓓ 2.08×10^{-2}
   Ⓔ 54.4

20) The specific heat capacity of methane gas is 2.20 J/g-K. How many joules of heat are needed to raise the temperature of 5.00 g of methane from 36.0°C to 75.0°C?
   Ⓐ 88.6
   Ⓑ 429
   Ⓒ 1221
   Ⓓ 0.0113
   Ⓔ 22.9

21) The specific heat capacity of liquid mercury is 0.14 J/g-K. How many joules of heat are needed to raise the temperature of 5.00 g of mercury from 15.0°C to 36.5°C?
   Ⓐ 7.7×10^{2}
   Ⓑ 15
   Ⓒ 36
   Ⓓ 0.0013
   Ⓔ 1.7

22) A 6.50-g sample of copper metal at 25.0°C is heated by the addition of 84.0 J of energy. The final temperature of the copper is _____°C. The specific heat capacity of copper is 0.38 J/g-K.
   Ⓐ 29.9
   Ⓑ 25.0
   Ⓒ 9.0
   Ⓓ 59.0
   Ⓔ 34.0