

Chapter 10

Multiple Choice

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

- _____ 1. A substance's temperature increases as a direct result of
- energy being removed from the particles of the substance.
 - kinetic energy being added to the particles of the substance.
 - a change in the number of atoms and molecules in a substance.
 - a decrease in the volume of the substance.
- _____ 2. What happens to the internal energy of an ideal gas when it is heated from 0°C to 4°C ?
- It increases.
 - It decreases.
 - It remains constant.
 - It is impossible to determine.
- _____ 3. Which of the following is proportional to the kinetic energy of atoms and molecules?
- elastic energy
 - temperature
 - potential energy
 - thermal equilibrium
- _____ 4. Which of the following best describes the relationship between two systems in thermal equilibrium?
- No net energy is exchanged.
 - The volumes are equal.
 - The masses are equal.
 - The velocity is zero.
- _____ 5. What is the temperature of a system in thermal equilibrium with another system made up of water and steam at 1 atm of pressure?
- 0°F
 - 273 K
 - 0 K
 - 100°C
- _____ 6. What is the temperature of a system in thermal equilibrium with another system made up of ice and water at 1 atm of pressure?
- 0°F
 - 273 K
 - 0 K
 - 100°C
- _____ 7. Heat flow occurs between two bodies in thermal contact when they differ in which of the following properties?
- mass
 - specific heat
 - density
 - temperature
- _____ 8. If two small beakers of water, one at 70°C and one at 80°C , are emptied into a large beaker, what is the final temperature of the water?
- less than 70°C
 - greater than 80°C
 - between 70°C and 80°C
 - The water temperature will fluctuate.
- _____ 9. All of the following are widely used temperature scales EXCEPT
- Kelvin.
 - Fahrenheit.
 - Celsius.
 - Joule.
- _____ 10. If 546 K equals 273°C , then 500 K equals
- 227°C .
 - 250°C .
 - 773°C .
 - 1000°C .
- _____ 11. A substance registers a temperature change from 20°C to 40°C . This corresponds to an incremental change of
- 20°F .
 - 40°F .
 - 36°F .
 - 313°F .

- _____ 12. A substance registers a temperature change from 20°C to 40°C. This corresponds to an incremental change of
- a. 20 K.
 - b. 40 K.
 - c. 36 K.
 - d. 313 K.
- _____ 13. Which of the following is the equivalent of 88°F?
- a. 31°C
 - b. 49°C
 - c. 56°C
 - d. 160°C
- _____ 14. What temperature has the same numerical value on both the Celsius and the Fahrenheit scales?
- a. -40°
 - b. 0°
 - c. 40°
 - d. -72°
- _____ 15. The average normal body temperature for human beings is 98.6°F. This corresponds to which of the following in degrees Kelvin?
- a. 296 K
 - b. 310 K
 - c. 393 K
 - d. 273 K
- _____ 16. If energy is transferred from a table to a block of ice moving across the table, which of the following statements is true?
- a. The table and the ice are at thermal equilibrium.
 - b. The ice is cooler than the table.
 - c. The ice is no longer 0°C.
 - d. Energy is being transferred from the ice to the table.
- _____ 17. Why does sandpaper get hot when it is rubbed against rusty metal?
- a. Energy is transferred from the sandpaper into the metal.
 - b. Energy is transferred from the metal to the sandpaper.
 - c. Friction is creating the heat.
 - d. Energy is transferred from a hand to the sandpaper.
- _____ 18. Energy transferred as heat always moves from an object
- a. at high temperature to an object at low temperature.
 - b. at low temperature to an object at high temperature.
 - c. at low kinetic energy to an object at high kinetic energy.
 - d. of higher mass to an object of lower mass.
- _____ 19. Which of the following terms describes a transfer of energy?
- a. heat
 - b. internal energy
 - c. temperature
 - d. kinetic energy
- _____ 20. If there is no temperature difference between a substance and its surroundings, what has occurred on the microscopic level?
- a. Energy was transferred from higher-energy particles to lower-energy particles.
 - b. Energy was transferred from lower-energy particles to higher-energy particles.
 - c. Thermal equilibrium was not reached.
 - d. Heat has been flowing back and forth.
- _____ 21. High temperature is related to
- a. low kinetic energy.
 - b. high kinetic energy.
 - c. no difference in kinetic energy.
 - d. zero net energy.
- _____ 22. What is the temperature increase of water per kilogram at the bottom of a 145 m waterfall if all of the initial potential energy is transferred as heat to the water? ($g = 9.81 \text{ m/s}^2$ and $c_p = 4186 \text{ J/kg}\cdot^\circ\text{C}$)
- a. 0.170°C
 - b. 0.340°C
 - c. 0.680°C
 - d. 1.04°C

- _____ 23. A 0.2 kg mass of metal with a specific heat capacity of $1.26 \times 10^3 \text{ J/kg}\cdot^\circ\text{C}$ and an initial temperature of 90°C is placed in a 500 g calorimeter at an initial temperature of 20°C with a specific heat capacity of $4.19 \times 10^2 \text{ J/kg}\cdot^\circ\text{C}$. The calorimeter is filled with 0.1 kg of water with an initial temperature of 20°C . When the combination of the metal, the calorimeter, and the water reaches equilibrium, what is the final temperature?
- a. 70°C
 - b. 60°C
 - c. 50°C
 - d. 40°C
- _____ 24. Which of two rods has the greatest thermal conductivity?
- a. a rod with electrons that are freer to move from atom to atom than are the electrons another rod
 - b. a rod with greater specific heat than another rod
 - c. a rod with greater cross-sectional area than another rod
 - d. a rod with greater length than another rod
- _____ 25. Find the final equilibrium temperature when 10.0 g of milk at 10.0°C is added to $1.60 \times 10^2 \text{ g}$ of coffee with a temperature of 90.0°C . Assume the specific heats of coffee and milk are the same as for water ($c_w = 4.19 \text{ J/g}\cdot^\circ\text{C}$), and disregard the heat capacity of the container.
- a. 85.3°C
 - b. 77.7°C
 - c. 71.4°C
 - d. 66.7°C
- _____ 26. The use of fiberglass insulation in the outer walls of a building is intended to minimize heat transfer through what process?
- a. conduction
 - b. radiation
 - c. convection
 - d. vaporization
- _____ 27. On a sunny day at the beach, the reason the sand gets hot and the water stays relatively cool is attributed to the difference in which property between water and sand?
- a. mass density
 - b. specific heat
 - c. temperature
 - d. thermal conductivity