CHAPTER 9 Review

TEMPERATURE AND THERMAL EQUILIBRIUM

Review Questions

1. What is the relationship between temperature and internal energy?
2. What must be true of two objects if the objects are in a state of thermal equilibrium?
3. What are some physical properties that could be used in developing a temperature scale?

Conceptual Questions

4. What property must a substance have in order to be used for calibrating a thermometer?
5. Which object in each of the following pairs has greater total internal energy, assuming that the two objects in each pair are in thermal equilibrium? Explain your reasoning in each case.
   - **a.** a metal knife in thermal equilibrium with a hot griddle
   - **b.** a 1 kg block of ice at −25°C or seven 12 g ice cubes at −25°C
6. Assume that each pair of objects in item 5 has the same internal energy instead of the same temperature. Which item in each pair will have the higher temperature?
7. Why are the steam and ice points of water better fixed points for a thermometer than the temperature of a human body?
8. How does the temperature of a tub of hot water as measured by a thermometer differ from the water's temperature before the measurement is made? What property of a thermometer is necessary for the difference between these two temperatures to be minimized?

Practice Problems

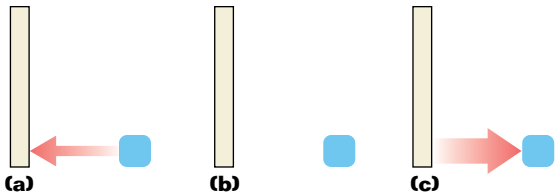
For problems 9–10, see Sample Problem A.

9. The highest recorded temperature on Earth was 136°F, at Azizia, Libya, in 1922. Express this temperature in degrees Celsius and in kelvins.
10. The melting point of gold is 1947°F. Express this temperature in degrees Celsius and in kelvins.

DEFINING HEAT

Review Questions

11. Which drawing below shows the direction in which net energy is transferred as heat between an ice cube and the freezer walls when the temperature of both is −10°C? Explain your answer.



12. A glass of water has an initial temperature of 8°C. In which situation will the rate of energy transfer be greater, when the air's temperature is 25°C or 35°C?
13. How much energy is transferred between a piece of toast and an oven when both are at a temperature of 55°C? Explain.
14. How does a metal rod conduct energy from one end, which has been placed in a fire, to the other end, which is at room temperature?
15. How does air within winter clothing keep you warm on cold winter days?