

## Chapter 10 – States of Matter

Chapter 10: 1 – 19, 21, 23, 25, 28, 29, 34, 44, 46, 51

### Section 10.1 – The Nature of Gases

#### Practice Problems

1. What pressure, in kilopascals and in atmospheres, does a gas exert at 385 mm Hg?
2. The pressure at the top of Mount Everest is 33.7 kPa. Is that pressure greater or less than 0.25 atm? Explain with mathematical proof.

#### Section Review 10.1

3. According to kinetic theory, how do the particles in a gas move?
4. Use kinetic theory to explain what causes gas pressure.
5. Express the pressure 545 mm Hg in kilopascals.
6. How can you raise the average kinetic energy of the water molecules in a glass of water?
7. A cylinder of oxygen is cooled from 300 K (27 °C) to 150 K (-123 °C). By what factor does the average kinetic energy of the oxygen molecules in the cylinder decrease?

## Section 10.2 – The Nature of Liquids

### Section Review 10.2

8. Describe the nature of liquids. Refer to the role of attractive forces in your answer.
  
  
  
  
  
  
  
  
  
  
9. Use kinetic theory to explain the differences between the particles in a gas and those in a liquid.
  
  
  
  
  
  
  
  
  
  
10. Use kinetic theory to explain the difference between evaporation and boiling of a liquid.
  
  
  
  
  
  
  
  
  
  
11. Use Figure 10.11 to determine the boiling point of each liquid.
  - a. ethanoic acid at 200 mm Hg
  
  
  
  
  
  
  
  
  
  
  - b. chloroform at 600 mm Hg
  
  
  
  
  
  
  
  
  
  
  - c. ethanol at 400 mm Hg
  
  
  
  
  
  
  
  
  
  
12. Explain why the boiling point of a liquid varies with atmospheric pressure.
  
  
  
  
  
  
  
  
  
  
13. Why does evaporation lower the temperature of a liquid?

## **Section 10.3 – The Nature of Solids**

### **Section Review 10.3**

14. Explain the nature of solids and tell why they differ from liquids. Refer to the organization of particles in your answer.

15. How does the crystal lattice of a solid differ from its unit cell?

16. How do allotropes of an element differ?

## **Section 10.4 – Changes of State**

### **Section Review 10.4**

17. What general information can you get from a phase diagram for water at various temperatures and pressures?

18. Describe the process of sublimation. What is a practical use of this process?

19. Explain triple point.

## **Chapter 10 Review**

21. List the various units used to measure pressure, and identify the SI unit. 10.1

23. Convert 190 mm Hg to the following. 10.1

a. kilopascals

b. atmospheres of pressure

25. Explain the relationship between the absolute temperature of a substance and the kinetic energy of its particles. 10.1

28. Express standard temperature in kelvins and standard pressure in kilopascals and in millimeters of mercury. 10.1

29. What is significant about the temperature absolute zero? 10.1

34. Explain vapor pressure and dynamic equilibrium. 10.2

44. Describe what happens when a solid is heated to its melting point. 10.3

46. When you remove the lid from a food container that has been left in a freezer for several months, you discover a large collection of ice crystals on the underside of the lid. Explain what has happened. 10.4

51. Why is the equilibrium that exists between a liquid and its vapor in a closed container called a dynamic equilibrium?