

Sample Problems

1. 51.3 kPa or 0.507 atm \rightarrow 385 mm Hg \times 101.3 kPa/760 mm Hg OR \times 1 atm/760 mm Hg
2. 33.7 kPa is greater than 0.25 atm \rightarrow 33.7 kPa \times 1 atm/101.3 kPa = 0.33 atm

Lesson Check Answers

3. A gas is composed of tiny particles whose motion is rapid, constant, and random. Collisions between particles are perfectly elastic.
4. Gas pressure is the result of simultaneous collisions of billions of rapidly moving particles with an object.
5. The Kelvin temperature is directly proportional to the average kinetic energy of the particles.
6. The oxygen molecule moves in straight-line random motion until it collides with another molecule or with the side of the container. After a collision, the direction of the motion changes.
7. a. 96 kPa
b. 6.0 kPa
8. by one-half
9. **BIG IDEA** As gas particles move, they spread apart filling all available space.

Lesson Check Answers

10. the interplay between the disruptive motions of particles in a liquid and the attractions among the particles
11. A molecule with a certain minimum kinetic energy can escape from the surface of the liquid and vaporize.
12. Rate of evaporation equals the rate of condensation.
13. Particles throughout the liquid must have enough kinetic energy to vaporize.
14. about 76°C; about 52°C
15. Boiling occurs when the vapor pressure of a liquid equals the external pressure. If the atmospheric pressure changes, the boiling point will change.
16. When the molecules with the highest kinetic energy escape from the liquid, the average kinetic energy of the remaining particles is lower and the temperature decreases.
17. **BIG IDEA** A liquid has a definite volume because of the attractive forces between the particles. A liquid conforms to the shape of its container because the kinetic energy of the particles allows them to move past one another.

Lesson Check Answers

18. Particles in solids are packed tightly together in an orderly arrangement. The locations of the particles are fixed.
19. The shape of a crystal reflects the arrangement of the particles within the solid.
20. Allotropes are different molecular forms of the same element in the same physical state.
21. The liquid and solid states are in equilibrium.
22. Ionic solids generally have higher melting points than do molecular solids.
23. A crystal lattice is a repeating array of unit cells.
24. **BIG IDEA** The particles in a solid are packed tightly together and are not free to move. This arrangement of particles gives solids its definite shape and volume.

Lesson Check Answers

25. Sublimation occurs in solids that have vapor pressures that exceed atmospheric pressure at or near room temperature.
26. The lines show the conditions of temperature and pressure at which two phases exist in equilibrium.
27. freeze-dried coffee, dry ice as a coolant, air fresheners, separating mixtures, and purifying substances
28. about 60°C
29. The triple point describes the only set of conditions at which three phases can exist in equilibrium.
30. The substance is likely molecular because the bonds between ions are typically stronger than the attractions between molecules.