

Liquids and Solids

1. What types of materials are used to reduce surface tension?
2. Why do soap and detergent makers value good wetting agents?
3. How does evaporation differ from boiling?
4. What is the relationship between volatility and vapor pressure?
5. What is the relationship between kinetic energy and temperature?
6. Why is the temperature of a substance constant during melting?
7. What does the triple point of water describe?
8. At 30°C, which would display a greater vapor pressure?
 - a. Motor oil or gasoline
 - b. Perfume or salad oil
 - c. Water or acetone
 - d. Water or mercury
9. In order to kill bacterial spores, the water in an autoclave must reach a temperature of 121°C. How is this temperature possible when water normally boils at 100°C and then converts to steam before increasing in temperature?
10. A beaker contains ice cubes and water at 0°C. An ice cube at -5°C is added to the beaker. After equilibrium is established the temperature is still 0°C.
 - a. What happened to the temperature of the new ice cube?
 - b. What happened to the water?
 - c. A small amount of warm water is added to the beaker. At equilibrium, the temperature is still 0°C. What happened to the warm water?
 - d. What happened to some of the ice?
11. Containers A, B, and C contain water at 120°C, 25°C and -10°C respectively, all at the same pressure.
 - a. Which sample has molecules with the greatest KE?
 - b. Which sample is the least compressible?
 - c. Which sample has the greatest density?
 - d. Which sample has the most regular arrangement of molecules?
 - e. Which sample(s) has (have) a definitely volume?
 - f. Which sample(s) has (have) a definite shape?
12. How can water be made to boil at room temperature?
13. Why is the boiling temperature of water lower in Denver, Colorado (elevation 1609 m) than in Boston, MA (at sea level)?
14. Explain why leftover food placed in a refrigerator tends to dry out if left uncovered.
15. A one-gallon can containing a small amount of water heated. After the water was boiled for a few minutes and the can is now filled with water vapor, a stopper was used to seal the can. Explain why the can collapsed upon cooling.
16. Which would cause a more severe burn, 1 gram of water vapor at 100°C, or 1 gram of liquid water at 100°C? Explain.
17. Water's molar enthalpy of fusion is 6.009 kJ/mol. Calculate the amount of energy as heat required to melt 7.95×10^5 g of ice.
18. Given that water has a molar of vaporization of 40.79 kJ/mol, how many grams of water could be vaporized by 0.545 kJ?

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