Chapter 11 Reading Guide **Name:**

AP Chemistry 2016-2017 **Date:** **Per:**

This chapter this a mixture of AP and non AP Chemistry curriculum. Concepts are primarily part of Big Idea 2 in the curriculum and the energy of phase changes are part of Big Idea 5. *Not in the AP Chemistry curriculum are phase diagrams, X-ray crystallography, crystal shapes and packing structures, and use of the Clausius-Clapeyron equation.*

11.1 Climbing Geckos and Intermolecular Forces

1. When the thermal energy of a substance is high relative to its intermolecular forces, what state of matter tends to exist?

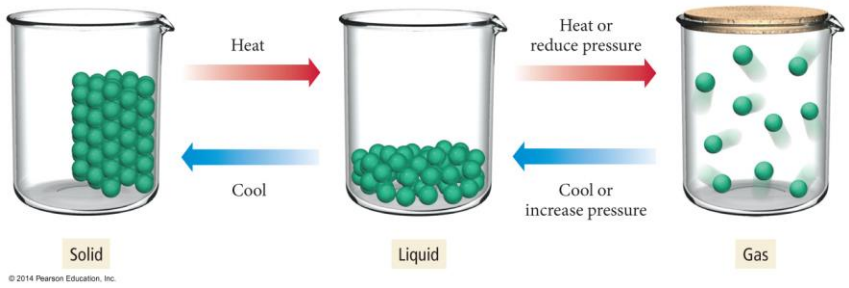
2. What state of matter tends to exist when the thermal energy of a substance is low in comparison to its intermolecular forces?

11.2 Solids, Liquids, and Gases: A Molecular Comparison

3. Using diagrams at the particulate level, explain the difference among solids, liquids, and gases.

4. Discuss two physical properties of each state of matter.

5. Explain in detail what is occurring between each arrow in the following diagram:



11.3 Intermolecular Forces: The Forces That Hold Condensed States Together

6. For each of the following intermolecular forces, state the types of substances likely to have the force. Also explain where it occurs, what creates the forces, how to determine if the force is present, and indicate how it is reflected in the melting points. Include a drawing of the force from a molecular perspective of the following intermolecular forces.

   Dispersion forces:

   Dipole-dipole forces:

   Hydrogen bonding:

   Ion-dipole forces:

11.4 Intermolecular Forces in Action: Surface Tension, Viscosity, and Capillary Action

7. Using intermolecular forces, explain the concepts of surface tension, viscosity, and capillary action.

8. Explain what is occurring and why in the following picture:

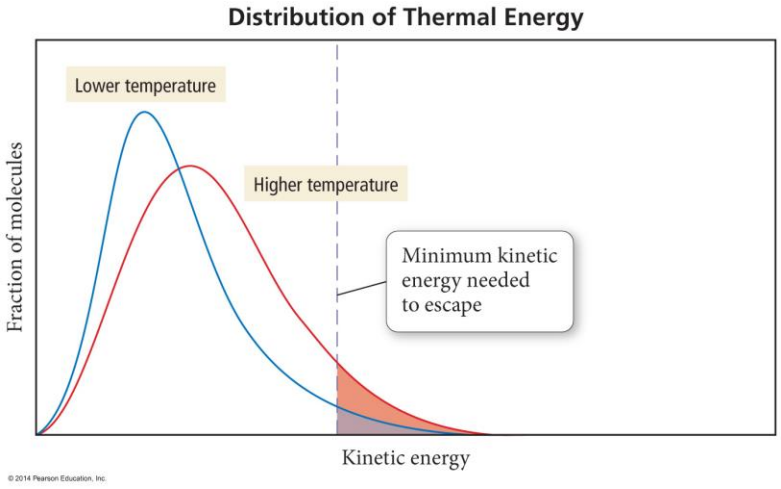
11.5 Vaporization and Vapor Pressure

9. Identify the endothermic process and exothermic process associated with vaporization and condensation. Explain why in each case.

10. Explain how the human body uses vaporization to keep cool.

11. What is the difference between a volatile and a nonvolatile substance?

12. Explain what a distribution a thermal energy for liquid molecules indicates.



13. Explain which volume of water will completely evaporate first at the same temperature and pressure and why: a 250mL beaker with 100mL of water or a 100mL volumetric flask with 100mL of water.

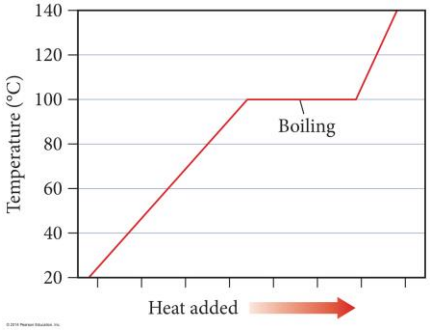
14. Under what conditions do a liquid and its vapor reach a dynamic equilibrium?

15. What types of substances have low vapor pressures? High vapor pressures?

16. What is the difference between a boiling point and a normal boiling point?

17. When water is being heated, how can you tell if the bubbles forming are air bubbles or bubbles of water vapor?

18. Using the following graph, explain how to identify the boiling point:



11.6 Sublimation and Fusion

19. Define the following terms

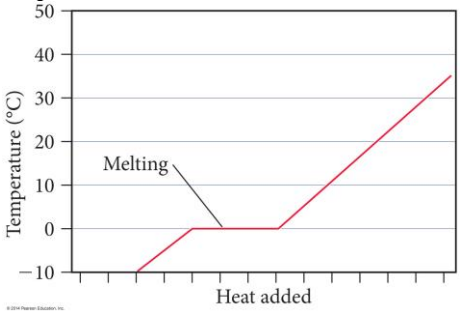
Fusion:

Melting:

Sublimation:

Deposition:

20. Explain how to determine the melting point on the following graph:



21. Why does the temperature of a drink with ice in it remain constant until all the ice has melted?

22. Identify each of the following processes as exothermic or endothermic: freezing, melting, subliming, and depositing.