Name: _____ **Date:** _____

Answer Key: Blast Through the Phase Change Barrier: 6th Grade Chemistry Challenge

Synthesize molecular behavior and kinetic energy concepts through a diverse question set designed to bridge the gap between macroscopic observations and microscopic particle motion.

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1. A scientist observes a substance in a sealed chamber. As the pressure is rapidly decreased without changing the temperature, the substance transitions directly from a solid to a gas. Which phenomenon is being modeled?

Answer: B) Sublimation

Sublimation is the phase transition where a substance bypasses the liquid state, moving directly from solid to gas, often triggered by specific temperature and pressure conditions.

2. In a closed system, when a gas loses kinetic energy and the attractive forces between particles begin to pull them into a fixed volume with a fluid shape, the process is called _____.

Answer: C) Condensation

Condensation occurs when gas particles slow down enough for intermolecular attractions to take over, forming a liquid.

3. During a phase change, such as water boiling at 100°C, the temperature of the substance continues to rise even as it absorbs more thermal energy.

Answer: B) False

During a phase change, temperature remains constant because the added energy is used to break the bonds between molecules rather than increasing their kinetic energy.

4. Which of the following scenarios best demonstrates the concept of 'Diffusion' in a gaseous state?

Answer: B) The scent of an orange being peeled spreading across a room

Diffusion is the movement of particles from an area of high concentration to low concentration, which happens rapidly in gases due to high kinetic energy and space between particles.

5. The state of matter characterized by particles that vibrate in a fixed position within a crystalline lattice is known as a _____.

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Answer: D) Solid

Solids have a rigid structure where particles lack enough energy to overcome attractive forces, resulting in vibration rather than flow.

6. In a liquid, the particles have enough kinetic energy to slide past one another, which allows the substance to flow while maintaining a constant volume.

Answer: A) True

This describes the fluid nature of liquids; particles are close together (fixed volume) but not locked in place (variable shape).

7. On a molecular level, what happens during the process of Deposition?

Answer: A) Gas particles rapidly lose energy and lock into a rigid structure.

Deposition is the reverse of sublimation; it occurs when a gas transforms directly into a solid, such as frost forming on a leaf.

8. Compared to a liquid, the particles in a gas have _____ attractive forces between them, allowing them to fill any container regardless of size.

Answer: C) Negligible

Because gas particles move so quickly and are so far apart, the attractive forces (intermolecular forces) between them are negligible or very weak.

9. Viscosity is a property used to describe the resistance of a gas to flow through a constricted space.

Answer: B) False

Viscosity is a property specifically associated with liquids, describing how easily they flow (e.g., honey has high viscosity; water has low viscosity).

10. You place a balloon over a beaker of boiling water. The balloon expands. Why does this happen based on the Kinetic Molecular Theory?

Answer: B) Thermal energy increases the speed of gas particles, causing more frequent and forceful collisions.

Increased temperature increases kinetic energy; gas particles move faster and push outward on the walls of the balloon with more pressure.

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