Name: _____ **Date:** _____

Molecular Motion: Marshmallow Matter Models for 6th Grade

Analyze kinetic energy and phase changes across 10 rigorous questions featuring industrial and culinary chemical applications.

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1. A chef is using liquid nitrogen at -196°C to flash-freeze physical property samples. Why does the nitrogen gas take up significantly more space than the liquid nitrogen?

A. The gas particles have increased in size.
B. The intermolecular distance between particles increases as kinetic energy rises.
C. Gas particles move in a fixed, vibrating pattern.
D. Liquid particles have no attraction to one another.

2. On a very cold winter morning, your car's windshield is covered in a thin layer of ice crystals, even though it did not rain or snow. This process of a gas turning directly into a solid is called _____.

A. Sublimation
B. Condensation
C. Deposition
D. Vaporization

3. True or False: In a crystalline solid like Gallium metal held in a warm hand, the atoms remain in a fixed position even after the substance begins to transition into a liquid.

A. True
B. False

4. Molten lava flowing down a volcano behaves differently than the solid rock it becomes. Which statement best describes the particles in the flowing lava?

A. They are vibrating in place within a rigid lattice.
B. They have enough energy to slide past each other while maintaining a fixed volume.
C. They are moving at high speeds with no attraction to one another.
D. They have lost all kinetic energy.

5. When a scuba diver releases air bubbles underwater, the bubbles expand as they rise toward the surface. This happens because gas has _____.

A. A definite shape
B. A fixed volume
C. No definite volume or shape
D. Highly packed molecules

6. True or False: Adding thermal energy to a beaker of boiling water will cause the temperature of the water to rise above 100°C while it is still in the liquid phase at standard pressure.

A. True

B. False

7. Consider a block of dry ice (solid carbon dioxide) sitting on a table. You notice it getting smaller, but there is no puddle of liquid. This is an example of:

A. Evaporation
B. Sublimation
C. Condensation
D. Conduction

8. The property of a liquid that describes its resistance to flowing, such as comparing the flow of maple syrup to water, is known as _____.

A. Density
B. Viscosity
C. Solubility
D. Compressibility

9. True or False: When water vapor touches a cold soda can and forms droplets, the water molecules are losing kinetic energy.

A. True
B. False

10. Why can a gas be easily compressed into a small cylinder (like a propane tank), but a solid iron bolt cannot?

A. Gas particles are larger than solid particles.
B. The iron bolt has more kinetic energy.
C. There is a vast amount of empty space between gas particles.
D. Solids have no intermolecular forces.