Name: _____ **Date:** _____

Stranger Things than Matter: 7th Grade Molecular Mystery

Calculate molar volume transitions and analyze kinetic molecular theory to predict how non-Newtonian fluids and supercritical fluids defy standard phase boundaries.

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1. A sample of Gallium melts in your hand at 29.7°C. While it is transitioning from solid to liquid, what happens to the average kinetic energy of the molecules?

A. It increases significantly as temperature rises.
B. It remains constant as energy is used to overcome intermolecular forces.
C. It decreases because the liquid state is less organized.
D. It fluctuates rapidly between high and low energy states.

2. In a laboratory, a scientist observes Iodine crystals turning directly into a purple vapor without becoming liquid. This endothermic process is called _____.

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

3. True or False: According to the Kinetic Molecular Theory, the particles in a Gill-sized sample of Neon gas at 100°C are in constant, random motion and have perfectly elastic collisions.

A. True
B. False

4. Which of the following scenarios best illustrates the concept of 'Deposition' in a natural environment?

A. Molten lava hardening into basalt rock.
B. Sub-zero water vapor forming intricate frost patterns on a cold windshield.
C. Dew forming on morning grass during a humid spring night.
D. An iceberg calving and drifting into warmer salt water.

5. If you increase the pressure on a gas while keeping the temperature constant, the _____ will decrease as the particles are forced closer together.

A. Mass
B. Volume
C. Particle speed
D. Chemical identity

6. True or False: Amorphous solids, such as glass or pitch, possess a highly regular, repeating geometric crystalline lattice structure.

A. True

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B. False

7. In a 'Supercritical Fluid' state, a substance like Carbon Dioxide exhibits which of the following unique behaviors?

A. It occupies a fixed shape like a solid but flows like a gas.
B. It possesses the density of a liquid but the ability to effuse through solids like a gas.
C. It loses all mass and becomes pure kinetic energy.
D. It can only exist at Absolute Zero (0 Kelvin).

8. Viscosity is a measure of a liquid's resistance to flow. As the temperature of a liquid like honey increases, its viscosity typically _____.

A. Increases
B. Decreases
C. Stays the same
D. Becomes infinite

9. True or False: Evaporation can only occur when a liquid reaches its specific boiling point throughout the entire volume of the substance.

A. True
B. False

10. Why does water expand when it freezes into ice, unlike most other substances that contract?

A. The molecules gain more kinetic energy as they slow down.
B. Hydrogen bonding creates a hexagonal crystalline structure with more empty space between molecules.
C. Air is trapped between the molecules during the cooling process.
D. The mass of the water increases as it transitions to a solid.