Name: _____ **Date:** _____

Answer Key: Why Doesn’t This Goo Obey the Law? 11th Grade Matter Quiz

Challenge your understanding of non-Newtonian fluids, vapor pressure curves, and the molecular forces that defy standard phase change expectations.

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1. A sample of Gallium melts in a scientist's hand at 29.7°C. Which statement identifies the thermodynamic process and the change in kinetic energy occurring?

Answer: D) Endothermic; potential energy increases

Melting is an endothermic process where energy is absorbed to overcome intermolecular forces; during the phase change itself, temperature remains constant (no ΔKE), while potential energy increases.

2. Supercritical fluids, such as CO2 used in decaffeinating coffee, possess the effusive properties of a gas but the dissolving density of a liquid.

Answer: A) True

Beyond the critical point, the distinction between liquid and gas disappears, resulting in a state that can penetrate solids like a gas and dissolve substances like a liquid.

3. At high altitudes like Mount Everest, water boils at roughly 71°C because the _____ is significantly lower than at sea level.

Answer: B) Atmospheric pressure

Boiling occurs when vapor pressure equals atmospheric pressure. Since pressure is lower at high altitudes, less thermal energy is required to reach that equilibrium.

4. Which substance would likely exhibit the highest viscosity at room temperature based on its molecular complexity and intermolecular forces?

Answer: B) Glycerol (C3H8O3)

Glycerol has three hydroxyl (-OH) groups per molecule, leading to extensive hydrogen bonding and high internal friction (viscosity).

5. In a phase diagram, the point where the solid, liquid, and gas phases coexist in dynamic equilibrium is known as the _____.

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Answer: C) Triple point

The triple point is the unique temperature and pressure condition where all three primary states of matter are stable and exist simultaneously.

6. Amorphous solids, such as obsidian (volcanic glass), possess a long-range repeating geometric lattice structure similar to Quartz crystals.

Answer: B) False

Amorphous solids lack the long-range order and crystalline structure found in substances like table salt or quartz; their particles are arranged randomly.

7. If you increase the pressure on a sample of ice near its melting point, it transitions to a liquid. What unique property of water causes this behavior?

Answer: B) Negative slope of the fusion curve

Water is denser as a liquid than a solid. Increased pressure favors the denser phase, meaning the melting point decreases as pressure increases (negative slope).

8. Volatile liquids, such as Acetone, evaporate quickly because they possess _____ and high vapor pressures.

Answer: C) Weak intermolecular forces

Weak London dispersion forces or dipole-dipole interactions allow molecules to escape the liquid phase into the gas phase more easily at a given temperature.

9. A student observes that Neoprene (a synthetic rubber) stretches but does not melt into a thin liquid when heated. This behavior is typical of which type of solid?

Answer: D) Polymeric/Amorphous solid

Rubbers are polymers; they often lack a sharp melting point and transition through a glass-transition stage rather than a clean phase change.

10. Kinetic Molecular Theory assumes that the volume of individual gas particles is negligible compared to the total volume of the container.

Answer: A) True

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A core postulate of KMT for 'ideal' gases is that the particles themselves occupy no volume, accounting for the high compressibility of gases.