Name: _____ **Date:** _____

Answer Key: What Dictates a Substance's Behavior? 7th Grade Particle Dynamics Quiz

Learners analyze kinetic energy and molecular attraction to predict how matter transforms, making this an ideal formative assessment for NGSS standards.

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1. A scientist observes a substance where the particles exhibit 'ordered vibrations' but do not move from their fixed positions. What would happen if thermal energy is added to this system?

Answer: B) The kinetic energy will increase until attractive forces are partially overcome.

Adding thermal energy increases the kinetic energy of particles; in a solid, this leads to melting as particles gain enough energy to slide past one another.

2. In a laboratory setting, _____ is the phase change that occurs when a gas loses enough thermal energy to become a liquid, such as when water vapor touches a cold mirror.

Answer: C) Condensation

Condensation is the exothermic process where gas particles lose kinetic energy and cluster together to form a liquid.

3. True or False: The temperature of a substance remains constant during the actual process of a phase change, even if heat is still being added.

Answer: A) True

During a phase change, the added energy is used to break or weaken molecular bonds (potential energy) rather than increasing the speed of the particles (kinetic energy/temperature).

4. Why does a gas expand to fill the entire volume of any container it is placed in, regardless of the container's shape?

Answer: A) Gas particles have high kinetic energy and negligible attractive forces.

Particles in a gas move rapidly and randomly; because their attractive forces are weak, they spread out until they hit the boundaries of their container.

5. Molten lava flowing down a volcano is an example of matter in the _____ state, characterized by having a definite volume but no fixed shape.

Answer: B) Liquid

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Liquids like lava have enough attractive force to maintain a consistent volume but enough energy for particles to flow around each other.

6. True or False: Liquid nitrogen turning into a visible 'cloud' at room temperature is an example of deposition.

Answer: B) False

This is vaporization (liquid to gas) or condensation of the surrounding air; deposition is the specific change from gas directly to solid.

7. Which of the following scenarios best demonstrates the concept of sublimation?

Answer: C) Solid air fresheners shrinking over time without leaving a liquid residue.

Sublimation is the transition from a solid directly to a gas. Solid air fresheners and mothballs are common everyday examples.

8. Standard pressure and temperature affect how matter behaves. If you were to climb a high mountain where air pressure is lower, the _____ of water would occur at a lower temperature.

Answer: B) Boiling

Boiling occurs when vapor pressure equals atmospheric pressure; lower pressure means less energy (heat) is needed for particles to escape into the gas phase.

9. What distinguishes the movement of particles in a solid like quartz from the particles in a liquid like honey?

Answer: B) Honey particles can slide past each other, while quartz particles only vibrate.

Even though honey is viscous, it is a liquid, meaning its particles have enough energy to flow, unlike the fixed-position particles in a solid.

10. True or False: Freezing is an endothermic process because you must 'add' cold to the substance.

Answer: B) False

Freezing is exothermic; energy must be removed (released) from the liquid particles so they slow down enough to lock into a solid structure.