

Science 8 2.3 Checking Your Understanding Questions (p. 145)

#1, 4, 5, 6, 7, 9

1.

Solid: has own shape, constant volume

Liquid: takes shape of container, constant volume (incompressible)

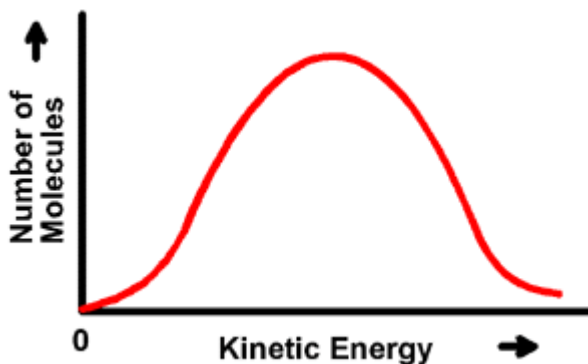
Gas: takes shape of container, volume not constant (compressible)

2. Answers may vary.

3. A liquid conforms to the shape of its container because in a liquid, particles are able to slip and slide past each other. Thus, given enough time, the particles slip and slide and also obey the laws of gravity, settling in to the bottom of the container they are placed in. However, particles in a liquid experience attractive forces to each other, so they will not expand to fill their container in the way that a gas will (particles in a gas do not experience any attractive forces to each other, and have enough energy to bounce randomly in all directions).
4. The glass filled with ice water is very cold, and is at the melting point of water. There is water vapour in the atmosphere: water vapour is water in its gaseous state. As time passes, water vapour particles will collide with the side of the glass. When they do, they lose a lot of energy because their kinetic energy is transferred to the cold cup of water. If they lose enough energy, they will undergo a change of state and condense to water. Thus, over time, condensation will accumulate on the side of the glass.
5. The ice cube is solid water: in a solid, particles have low kinetic energy and are at a low temperature. The warm water is a liquid: in a liquid, particles have more kinetic energy and are at a higher temperature. When the ice cube is placed into warm water, random collisions will occur between the liquid and the solid particles; these collisions will transfer kinetic energy from the liquid to the solid. When the solid particles acquire enough kinetic energy, they will undergo a change of state from solid to liquid, and melt to become part of the liquid water. Overall, the water will decrease in temperature (become colder) because the kinetic energy has been lost from the water and used to break down the attractive forces in the ice cube to melt it. Thus, you will go from warm water + ice to cold water.
6. Air fresheners consist of highly concentrated odours. When hung in a car, the odour diffuses throughout the air in the car. Air particles with high kinetic energy are constantly moving throughout the car. When they collide randomly with the oil in the air freshener, there is a chance that they will knock some of the odorant particles off of the air freshener. When this occurs, the odorant becomes evenly mixed with the air, and improves the smell of the car.
7. Temperature is a measurement of the average kinetic energy of the particles in a sample. Even within a sample, there will be some particles with a higher-than-average kinetic energy, and

others with a lower-than-average kinetic energy. In a standard bell-curved distribution of molecules, chances are that some of them will have a high enough kinetic energy to break the attractive bonds between themselves and other water molecules, and 'escape' from the puddle as a gas. Over time, the puddle will evaporate as more and more particles escape, even if the temperature of the puddle itself never reaches 100 degrees.

Alternate explanation: whenever particles collide, kinetic energy is transferred. In the air, the kinetic energy of the gas molecules is high. Random collisions between the gas particles and the liquid particles in the puddle will transfer some kinetic energy to the liquid particles, which will increase in kinetic energy. Once they reach a high enough kinetic energy, they will overcome the attractive forces holding them to other water molecules, and escape as gaseous particles.



9. Answers may vary.