

Grade 11 NTI Day #2 Chemistry

Assignment: Please read the excerpt below as an independent reading assignment. Then read and answer the questions below the excerpt.

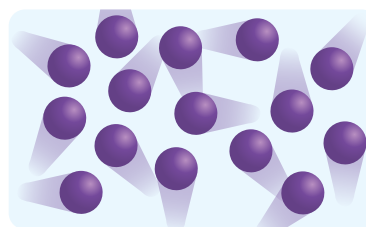
# Energy

**Energy** is the capacity to move, do work, change matter, or produce heat.

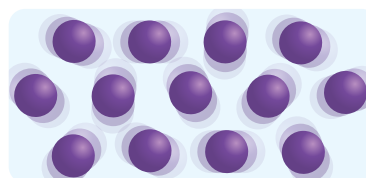
**Kinetic energy** is the energy that matter has because of its motion. **Thermal energy** of matter is the total kinetic energy of all the particles that make up the matter. **Potential energy** is the stored energy in matter due to its position relative to other matter. **Chemical potential energy** is the energy stored in the chemical bonds that hold atoms together; this energy can be released or absorbed during a chemical process.



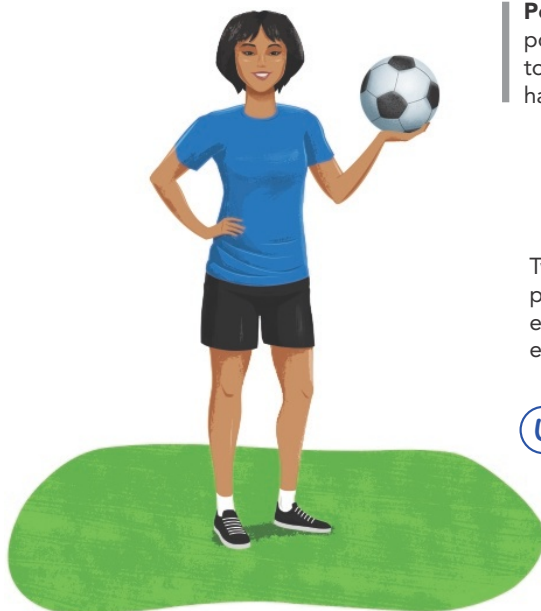
**Kinetic Energy** A moving object, such as this ball, has kinetic energy.



Atoms are constantly moving. They have kinetic energy, like moving balls.




Even atoms in solids have kinetic energy because they vibrate back and forth.



**Potential Energy** An object can also have potential energy because of its position relative to other objects. A ball held above the ground has potential energy. If dropped, it will fall.



Two oppositely charged particles have potential energy. When they are close enough together, they are attracted to each other.

**CCC Cause and Effect** Draw an arrow in the figure of the player holding a soccer ball to show the direction the ball will move if the person stops holding it. Add arrows to show how the charged particles in the figure will move. Discuss your reasoning with a partner. 

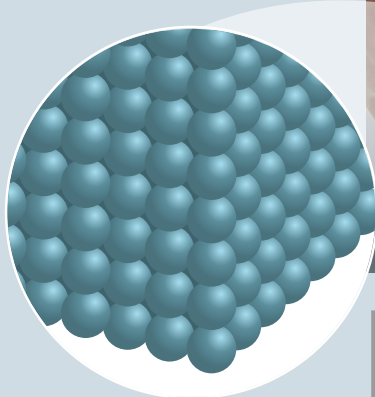
# Interaction of Matter and Energy

A **system** is a portion of the universe that a scientist identifies for study. The **surroundings** are everything else around the system.

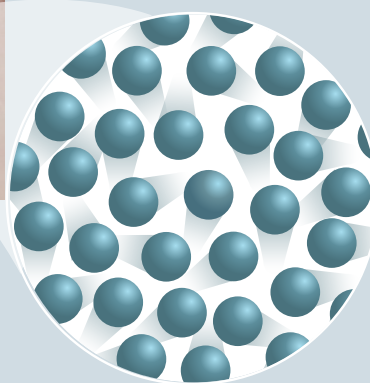
► Energy can flow into a system from the surroundings. It can also flow out of a system into the surroundings.

A change in the temperature of a system is one indication that the energy of the system has changed. As the energy of matter changes, its macroscopic properties can change. A **macroscopic property** is a characteristic that is large enough to see, handle, or measure without magnification. An example is melting point. A solid can melt into a liquid when it gains enough energy and reaches its melting point.

**Solid Gallium** Solid gallium has a definite shape and volume. Gallium atoms in solid gallium have less kinetic energy than those in liquid gallium.



**Liquid Gallium** Liquid gallium flows into different shapes, but its volume does not change. The particles in liquid gallium have more kinetic energy than those in solid gallium but less than the particles in gaseous gallium.



**System and Surroundings** A piece of gallium can be defined as a system. The hand is part of the surroundings. The hand is warmer than the piece of gallium. The hand transfers thermal energy to the gallium, causing it to melt.

7 **CCC Systems and System Models** Liquid gallium changes to a gas at 2229°C. Describe how a model of gaseous gallium would compare to the model of liquid gallium shown in the picture. ✎

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## Chemistry Assignment: Energy and the Interaction of Matter

1. Which of the following is an example of kinetic energy?

- A) A ball held above the ground
- B) A motionless piece of solid gallium
- C) A moving soccer ball
- D) A chemical bond between two atoms

2. What is thermal energy?

- A) The energy stored in chemical bonds
- B) The total kinetic energy of all particles in a substance
- C) The energy an object has because of its position
- D) The amount of potential energy in a solid

3. How does potential energy differ from kinetic energy?

- A) Potential energy is stored energy due to position, while kinetic energy is energy of motion
- B) Potential energy only exists in gases, while kinetic energy exists in liquids
- C) Kinetic energy is stored in bonds, while potential energy is related to motion
- D) Kinetic energy is stored energy, while potential energy is the energy of motion

4. What happens to the kinetic energy of gallium atoms when solid gallium melts into a liquid?

- A) The kinetic energy decreases
- B) The kinetic energy remains the same
- C) The kinetic energy increases
- D) The kinetic energy disappears.

5. **Short Answer: Describe the difference between solid and liquid gallium in terms of kinetic energy and molecular behavior.**