

SECOND TERM 2023-2024 (WEEK 1)

JS 2

BASIC SCIENCE

TYPES OF ENERGY: KINETIC ENERGY

Meaning of Kinetic energy

Kinetic Energy:

Kinetic energy is the energy possessed by an object due to its motion. *The formula for kinetic energy (KE) is $KE = 0.5 m v^2$, where m is the mass of the object and v is its velocity.*

Examples of kinetic energy include the motion of a car, a moving train, or a spinning top.

Assumption about Kinetic Energy

The kinetic energy of an object is directly proportional to its mass and the square of its velocity. Therefore, assuming all other factors remain constant, an increase in either the mass or velocity of an object would result in an increase in its kinetic energy.

Explanation of some phenomena using kinetic theory

Gas Pressure:

The kinetic theory of gases explains pressure as the result of gas molecules colliding with the walls of their container. The more frequent and forceful the collisions, the higher the pressure.

Temperature:

Temperature is related to the average kinetic energy of particles in a substance. Higher temperatures indicate greater average kinetic energy, while lower temperatures indicate lower kinetic energy.

Explanation of Boiling and Evaporation Using Kinetic Theory:

Boiling:

Boiling occurs when the vapor pressure of a liquid equals the atmospheric pressure. In the kinetic theory, heating a liquid increases the kinetic energy of its molecules. At the boiling point, molecules throughout the liquid gain enough energy to overcome intermolecular forces and enter the gas phase.

Evaporation:

Evaporation is the process by which molecules in a liquid gain enough kinetic energy to escape the liquid phase and become vapor. The kinetic theory explains that higher temperatures increase the average kinetic energy of molecules, facilitating their escape from the liquid into the vapor phase.

Factors Affecting Evaporation:

Temperature:

Higher temperatures increase the kinetic energy of molecules, leading to more rapid evaporation.

Surface Area:

A larger surface area allows more molecules to escape from the liquid, increasing the rate of evaporation.

Humidity:

Lower humidity means drier air, which can absorb more water vapor, enhancing the rate of evaporation.

Wind Speed:

Increased wind speed removes water vapor from the vicinity of the liquid, promoting faster evaporation.

Nature of the Liquid:

Liquids with weaker intermolecular forces tend to evaporate more quickly than those with stronger forces.