THE ROLE OF MOLECULAR PHYSICS IN TEACHING PHYSICS IN HIGH SCHOOLS

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Abstract: Molecular physics is one of the important branches of physical science, which explains the properties of particles - molecules that make up matter on the basis of molecular - kinetic theory. In addition, it teaches processes such as the transition of matter from one state to another and their laws.

Key words: Molecular physics, matter, particles, molecular-kinetic theory, heat, molecular form, diffusion, Brownian motion, electron mass, proton mass, thermal energy, mechanical energy.

The development of the human world is largely related to the development of natural sciences, especially physics. Physics is one of the main sciences that teach natural phenomena. Understanding and thinking about natural phenomena, interest in knowledge and observation of humanity leads to increase in its level of development.

The development of natural sciences, including physics, is based on observations, experiments, and research into the causes of phenomena. Physical science develops and is constantly enriched with quantitative and qualitative changes.

The world that surrounds us is material, it is made up of continuously moving matter.

For example, everything from stars and planets to tiny particles in atoms and cells in living organisms are in constant motion.

Qualitative and quantitative changes in them occur due to chemical, biological and physical actions. Physical motion consists of mechanical, thermal, electromagnetic and other types of motion.

Mechanical movement studies the change of position of macro bodies or parts of bodies relative to each other in space over time. For example, the movement of space objects can be shown. In addition, the department of mechanics teaches the movement and rotation of rigid bodies, the forces acting on bodies and the conditions for their equilibrium.

Molecular physics explains the properties of particles and molecules that make up matter on the basis of the molecular-kinetic theory. In addition, it deals with processes such as the transition of matter from one state to another and their laws.

The molecular-kinetic theory of matter is based on the following three experimentally verified rules.

1. Matter consists of particles (molecules).
2. Particles are always in random (Brownian) motion
3. There are interaction forces between them.

The molecular structure of matter in the late 17th and early 19th centuries

The gas laws discovered by Boyle-Mariott, Gay-Lussac, Dalton, and Avogadro on the basis of experiments play an important role in the creation of the molecular theory of the structure of matter.

By the second half of the 19th century, the basic laws of the molecular-kinetic theory were created.

Based on the molecular-kinetic theory, the English botanist Brown found out that molecules of matter are in irregular and continuous motion. Brown showed that this action depends on temperature. That is, Brownian motion accelerates at high temperature, and slows down at low temperature.

An important phenomenon that proves the existence of a molecular form of motion is diffusion. Even if the diffusion phenomenon occurs in any aggregate state of the substance, it occurs slowly in the solid state, faster in the liquid state, and faster in the gas state.

The rate of diffusion also depends on the temperature of the substance. A molecule is the smallest particle that contains all the chemical properties of a substance.

Between the molecules, there are forces of mutual attraction and repulsion, and depending on the value of these forces, exactly one substance can be in a solid, liquid, or gaseous state.

In molecular physics, by the 19th century, very small electron mass m_e=9.11·10^(-31) kg , 〖 and proton mass m〗_p=1.66·10^(-27) kg were composed of particles. size d=10^(-8) m=10^(-10) cm. In the 20th century, the nuclear model of the atom was discovered. It was determined that the diameter of the nuclear model is d_ya=10^(-12) m and it is composed of protons, m_p=〖 1836 m〗_e=1.66·10^(-27) kg.

Direct conversion of thermal energy into mechanical energy is one of the greatest discoveries of molecular physics. Especially in recent years, achievements in the physics of solid bodies are not only the basis of cybernetics, but also serve as an important factor in the creation of electronic computing machines. These achievements speed up theoretical calculations of physics, increase the accuracy of experimental results and speed up their systematization. This allows science to develop, to make new discoveries in science.

Thus, the practical importance and place of the science of molecular physics in the study of general physics is very great, and it plays an important role in its development.

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