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METHODOLOGY FOR TEACHING THE SUBJECT SOLID STATE PHYSICS USING THE GRAPHIC ORGANIZER METHOD

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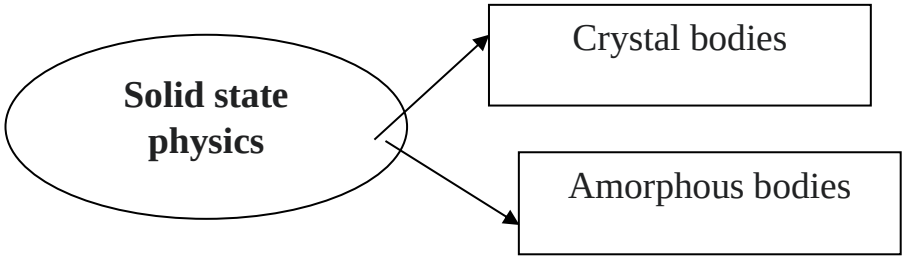
Abstract:
General information is given about the types, main characteristics, and physical structure of solids. Using the method of teaching silent views through the method of graphic organizers.

Keywords: solids, crystalline and amorphous bodies, crystal lattice, single crystals, polycrystals.

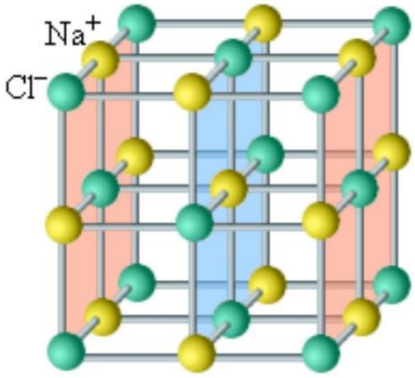
Introduction

Substances in nature exist in gaseous, liquid, solid and plasma states. These states are called aggregate states of matter and differ from each other in their physical properties. Solids differ from liquids and gases in that they retain their shape and do not flow. Solids have more precise geometric shapes than gases and liquids. In solids, the energy of interaction between molecules or atoms significantly exceeds the energy of their thermal motion, so they cannot move freely and oscillate around equilibrium positions. So, the main differences that distinguish a solid from other states of aggregation are:
firstly, that it retains its shape under normal conditions;
lies in the fact that they, the atomic molecules that make them up, are in vibrational motion.
In the learning process, students are considered as individuals, the use of various pedagogical technologies and modern methods allows them to think independently, freely, improve their communication abilities, establish an emotional connection between students, search, approach each issue. creatively, a sense of responsibility, conducting scientific research, analysis, effective use of scientific literature, and most importantly, increasing interest in reading, science and the chosen profession.
Graphic organizers (organizer) are a means of visually representing thought processes.
Graphic organizers are a set of drawings, tables, graphs that help achieve the set goal in the educational process. If graphic organizers are used by the teacher in a ready-made, completed form, then they will act as a tool, and if they are used to consolidate students' knowledge and thinking on the topic of the lesson, then they will act as a method.
For example, when teaching the module "Solid State Physics," the use of graphic organizers allows you to explain the topic based on a step-by-step diagram and obtain a qualitative analysis of monitoring and assessing students' knowledge.

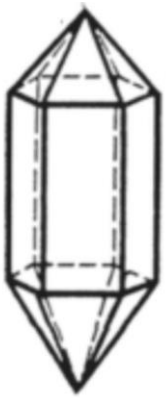
Solid State Physics- a branch of physics that studies the structure and basic properties of solids and the phenomena occurring in them.



The most characteristic feature of crystalline solids is that their constituent particles have a precise geometric shape. For example, NaCl table salt crystals have a cubic shape (Fig. 1), quartz crystals have a prismatic shape (Fig. 2).



Picture 1



Picture 2

The main characteristic feature of crystalline bodies is the presence of anisotropy.

Anisatropy - They say that the physical properties of a homogeneous body are different in different directions.

For example, in crystalline bodies, the coefficient of thermal conductivity, the speed of propagation of light, the modulus of elasticity, the coefficient of thermal expansion and other physical properties are different in different directions. The main feature of crystalline bodies is the arrangement of particles (atoms, molecules or ions) in a certain order. The crystal lattice is a periodically repeating arrangement of particles according to their sizes for the equilibrium state of crystals. X-rays are used to measure the average distance between particles and to determine that crystalline solids have a particular lattice

structure. In crystalline bodies, the arrangement of particles in a certain order applies to the entire volume of the body, and this is called long-range order.

Such an ordered arrangement of particles in amorphous bodies is characteristic only of neighboring atoms; it is called close order. Amorphous bodies differ sharply from crystalline ones in their thermal properties. If heat is applied to amorphous solids in the same way as to crystalline solids, the part that is affected by the heat changes to a liquid state and the rest remains in a solid state. Its temperature in both cases is completely different. Therefore, amorphous bodies do not have a specific melting point like crystalline bodies. Amorphous bodies are isotropic, that is, they have the same properties in different directions. Amorphous solids include resin, plastic, glass, polymers and other solids.

The presented modern methods and graphic organizers contribute to the formation of logical, intellectual, creative, critical, independent thinking in students, develop their abilities, provide competitive, aesthetic education, psychologically study the student, relieve mental fatigue, form creative abilities in students, create a psychological climate and educate professional quality.

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