

METHODOLOGY FOR CHOOSING ISSUES OF ECOLOGICAL CONTENT FROM MOLECULAR PHYSICS

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Abstract. *The article discusses the identification and implementation of ecological issues in molecular physics, as well as the didactic principles of continuity, clarity, relevance, theory and practice. Solving problems in the process of teaching physics has an important educational function. During the teaching process, students fully assimilate new topics, strengthen their knowledge and skills, and identify ecological issues to shape and develop their knowledge, skills and attitudes accordingly. In the presentation of topics, materials from the field of science and technology, teaching methods and tools were used, as well as taking into account the age characteristics, level of knowledge, skills and interests of students. Teaching physics helps students understand modern technology and the scientific basis of technology, and helps them understand the laws that govern the world around us. In particular, it helps to understand the laws of nature in relation to the environment and to analyze them from a physics perspective. In rural schools, students are interested in the ecological state of their country, analyzing environmental issues from a physics perspective and participating in their practical implementation helps to solve these problems. Because of solving a large number of problems related to physics and ecology, it is possible for students to gain practical experience in the field of physics, which can help them to better understand the ecological situation in their country. The article presents 13 topics related to the ecological content of physics and provides materials for studying them. In conclusion, it can be said that ecological issues in physics are underutilized in schools. If every physics teacher actively uses the issues presented in this article during their teaching activities, it will be beneficial to achieve educational goals. Therefore, the identification and implementation of ecological issues in physics in general education schools is of great theoretical and practical importance.*

Keywords: *physics, ecology, country, nature, problem, farmer, agriculture, environment.*

Introduction

Nowadays, there are many cases of disturbance of the natural balance due to the development of technology. This situation negatively affects the life of biological organisms on Earth. To maintain natural processes in a normal state, it is necessary to have thermodynamic processes in the atmosphere that regulate the interaction between the Earth and the air surrounding it. Therefore, learning and using the laws of nature in a scientific way is one of the most relevant issues of our time. In the current era of technological development, it is necessary to shape a person who does not harm the environment, but rather protects it, preserves it for future generations, and uses it wisely. Every period and place has its own peculiarities of cleanliness and orderliness, which are important factors in human life. Solving ecological problems that arise in harmony with development is a vital issue. The "Green Area" project, which aims to plant trees, is a good example of this. Years of experience show that 40 people can produce 1 ton of carbon dioxide in an hour, but 1 hectare of forest produces 30 tons of oxygen per year. In addition to being a source of oxygen, forests also provide water through their roots and protect against erosion and noise pollution, contributing positively to our physical and mental health. Therefore, during the learning

process, students should be taught knowledge based on respect for nature, sensitivity, justice, and love for nature, which will help them in their future lives. It is known that high school students in general education schools have direct contact with agricultural technology and technology, and they communicate with farmers. Their participation in socially useful work helps them to learn about reality and broaden their horizons. Understanding the laws of nature and their interconnection contributes to the development of nature and society.

Analysis of literature and methodology

In today's world, the practical application of theoretical knowledge gained from physics, especially by young people who have a strong foundation in physics, is an essential factor in the positive development of the environment. Therefore, physics education should be linked to ecology, and students should learn how to apply their knowledge of physics to agricultural production. Mirboboev M., Turdiqulov E.A., Orolov M., and others have done significant work in this area, both in the classroom and in practical applications.

The psychological and pedagogical aspects of physics learning are also important in understanding natural phenomena. Kamenetsky S.A., Tulkiboeva N., Esaulova A.F., and others have conducted scientific research on these topics. It is essential to understand that literary analysis alone is not sufficient.

Students should have hands-on experience with the material they learn in class. This helps them to develop a deeper understanding of the subject matter and enhances their ability to apply their knowledge effectively. Students should be aware of the environmental issues affecting their country, such as pollution, deforestation, and other anthropogenic factors that have a negative impact on nature and human activity. Therefore, it is crucial to teach students about nature and its protection during physics education.

The molecular physics section of physics is based on the concept of matter's atomic-molecular structure and the movement of atoms and molecules without any resistance or order. The molecular kinetic theory explains any heat process or event. The expansion and contraction of bodies due to heat and cold are of great importance in nature. The convection current in the atmosphere brings about changes in weather patterns, while ocean currents affect the climate of coastal countries. The temperature fluctuation is more pronounced in mountainous regions. This leads to an increase or decrease in the size of mountains. Students must first understand that matter consists of various elements, and atoms and molecules form these elements. They must also understand how atoms and molecules interact with each other and the effects of these interactions, which can lead to various phenomena. Students who have a good understanding of the fundamental laws of molecular kinetic theory can apply their knowledge to real-world situations.

Find answers from the A and B groups for each question.

Questions:

1. In which experiments is the fact that each body consists of molecular particles observed?
2. Which evidence confirms the presence of empty spaces between molecules?
3. Which experiments confirm the existence of intermolecular forces in solid bodies?
4. Which experiments confirm the presence of intermolecular forces in gas molecules?
5. Which experiments confirm the presence of intermolecular forces in liquid bodies?
6. Which evidence confirms the existence of repulsive forces between molecules?
7. What is the nature of the intermolecular attraction and repulsion forces?
8. What is diffusion and how can it be concluded?

9. What is Brownian motion?

t/p	Group A questions	Group B questions
1	The freezing of liquids, the expansion of bulky materials, the behavior of rigid bodies, the rapid spread of gaseous substances in the air, and so on.	When solid, liquid, and gaseous substances are entered, they exhibit resistance...
2	The external forces of two molecules interact with each other and they move freely. This indicates the perpetual motion of these molecules.	The molecules of small solid or suspended particles in cold or gas move randomly due to the interaction of external forces. This indicates the chaotic movement of these molecules.
3	When a small solid or suspended particle is rapidly agitated in a vacuum, some of the heat energy is expended to increase the motion of the particles in order to promote their collision.	In solids, this movement is fast (on the order of minutes), in liquids it is slower (on the order of days), and in gases it is very slow (on the order of years).
4	Gravitation...	Electronic...
5	To extract a small plate from a dry substance, a considerable amount of force is required to be used in order to separate it.	In solids, this process is slow (taking years), in liquids it is slower (taking days), and in gases it is very slow (taking minutes).
6	When two particles of the plate are rubbed against each other with the cleaned surfaces, they stick together completely, requiring a large force to break them apart, which requires a lot of energy, etc.	In external pressure, the volume of gases, liquids and solids does not increase. When heated or cooled, the volume changes, etc. This confirms that...

By using the methods shown above, teaching physics can deepen knowledge, develop new opportunities, and lead to the selection and resolution of environmental issues.

The following ecological topics related to physics were presented to students as examples:

1. Problem: What causes the decrease in moisture in the soil during hot summer days?

- A. Diffusion process
- B. Condensation process
- C. Convection process
- D. Evaporation process

2. Problem: Why is it necessary to water plants during cold winter days?

- A. Cold weather can freeze plant roots.
- B. Water freezes and pushes soil apart.
- C. Water absorbs heat and moves away from plants.
- D. Plants need more water during winter.

3. Explain the ecological significance of understanding the physics behind storing fresh crops and hay on farms.

4. How does an electric field affect the growth and development of crops in a cultivated field?

5. Explain the ecological significance of poor crop growth in a cultivated field due to improper soil structure.

6. What is the scientific basis for the processing of wool from sheep and what is its ecological importance?

These problems can be given to students as homework.

1 - problem: The ways in which trees in riverbeds are uprooted due to the strong flow of water during floods are frequently observed. Explain the ecological significance of this phenomenon.

2 - problem: The function of the buds in the branches of trees that have been planted for many years is related to their growth. What is the purpose of the buds that accumulate on the branches of trees?

3 - problem: Trees with deep roots are more resistant to drought. Explain the ecological significance of this question.

4 - problem: It is not possible to irrigate plants when they are exposed to sunlight. Why is this?

5 - problem: If the mass of a cheese block taken out of the refrigerator is 60 g and its mass after being smoked is 40 g, determine the moisture content of the cheese.

6 - problem: If a salt solution with an osmotic pressure of 100 kPa, a mass of 250 g, a volume of 0.002 m³, and a temperature of 70C is produced by evaporating two liters of brine, what is the molar mass of the salt solution?

7. problem In Tashkent, there are a lot of pollutants. Why? Is it possible to reduce pollution levels? Explain from an ecological perspective.

RESULTS AND CONCLUSIONS

In order to address the benefits and harms of human influence on nature from a dialectical perspective, it is important to teach students to deeply understand natural phenomena based on the laws of physics, to have a positive attitude towards it, and to draw correct conclusions. Teachers should teach students to have a respectful attitude towards nature and to develop an environmentally friendly mindset. In addressing issues such as improving the quality of education and raising it to a new level, ideas such as increasing its relevance are of great importance. At present, young people are somewhat disinterested in subjects. At such times, every teacher should have a variety of methods to make lessons more interesting, and definitely pay attention to both human and national upbringing during the process of teaching physics. Upon completing school, every farmer who works in agriculture should have knowledge of agricultural technology to provide themselves with work, prepare the soil and seeds for planting, and have an understanding of the physical, mechanical, biological, and chemical properties of soil and crops during the planting process. It is necessary to pay attention to ecological issues when introducing the scientific foundations of physics that govern the process of planting, which will be revealed during the planting process. For choosing and solving ecological problems with ecological content in physics, a method has been developed that proves its effectiveness and recommends teaching physics in all schools.

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