METHODOLOGY OF SELECTION AND SOLUTION OF PROBLEMS IN THE ENVIRONMENTAL CONTEXT FROM ELECTRODYNAMICS

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ABSTRACT

The paper outlines the principles of electrodynamics and the method of solving environmental problems in a logical, consistent, and didactic manner.

Keywords: Ecology, education, upbringing, principle, knowledge, skills, environmental security, environmental disaster, ecological crisis.

INTRODUCTION, LITERATURE REVIEW AND DISCUSSION

So far, in the Republic of Uzbekistan, the problem of selecting and solving environmental problems is not worked sufficiently scientific and methodical. Some issues of teaching students to formulate issues in their teaching have been included in the work of A.P. Rimkevich [120], V.P. Demkovich [57], A.P. Demkovich [57, 58], V.E. Voldorsky [44, 46], N. Tulkibaeva [131], V.P. Orekhova [76], L.M. Friedman [143] and others. Given the aforementioned, this inevitably causes the students' physical knowledge of the country's ecology to be shallow.

Solving problems in physics teaching shapes students' abilities and skills to apply theoretical knowledge in practice.

Students have to solve many problems in physics in everyday life and in production. Therefore, students should be able to solve not only environmental issues, but also use common approaches to solving any creative problem. Physics is not only a means of acquiring and deepening theoretical knowledge, but also connecting the school with life and preparing students for practical activities.

Choosing and solving problems in physics in an ecological context, connecting students to the theory with practice will help them to develop skills, and to gain a deeper knowledge.

Before selecting and solving examples of physics in ecologic context, the analysis of the condition of the problem begins with the teacher's explanation. At the same time, attention is drawn to the extent to which students are searching for a problem and the physical basis of the ecology of the country. The next step in solving environmental problems from physics is to write down the condition of the problem. It is important to identify the system of units in solving the problem. It then goes directly to the most important of these steps.

The solution of selected problems in physics in the ecological sense is to explain its physical nature, the physical processes and phenomena described in it. Therefore, the selection and solution of problems in physics in an ecological context are as follows the steps for solving traditional problems:

1. Read the condition of the case.
2. Explain the meaning of vague terms and restore relevant concepts in memory.
3. Analyze the problem firstly.

4. Write a case study.
5. Determine the units of magnitude in Si to solve the problem and express them in Si.
6. Write the formulas for the problem, make a table, and draw a graph.
7. Find the numerical values of size.
8. Explain the physical nature of the answer.

It is desirable to recommend physics in the 9th-10th grades in physically and ecologically selected issues. Students know the need for directly theoretical knowledge to solve the physics problems of the country's ecology. In the system of various forms of linking physical education with the ecology of the country, the selection and solution of such problems is an important link between theory and practice. However, practically no physics questions that characterize the nature of our country are included in the collections of physics issues used in general secondary schools. The school teachers have difficulty teaching how to select and solve problems concerning the physical basis of the country's ecology. With this in mind, we have chosen the tasks of physics in the ecological sense.

Teaching physics based on country ecology allows students to familiarize themselves with various interconnected processes or ecology of the country. We know that the choice and solution of problems in physics in an ecological context consists of two parts: physical and mathematical. The first part consists of explaining the physical processes and the state of the ecology of the matter, determining the number of connections between certain sizes, writing the formulas, and making equations based on particular theoretical and experimental data. The mathematical aspect is to solve various equations, to solve the equation, and also to calculate the magnitude sought by applying mathematical rules.

Now, let's look at a few issues in physics that have been banned from physics in the environmental context for Grade 10 students on "Electrostatic Field" and "Electric Field Amplification":

Issue 1. Given the technology of cotton and its environmental state, how much is the charge charged by the electric field 4200 W/m between the two spit of cotton with a diameter of 90 cm and a dielectric input 8?

Before tackling this problem, the teacher reminds the students to make sure everything is clear.

1. It is important to read carefully the context of the issue, to understand what is being said and required.
2. Physical analysis.
3. How to solve the problem.
4. Perform the calculation.

Given:	**In Si:**	**Formula:**
r = 90sm	0,9 m	E = F / q;
ε = 8	8	$F = 1 / 4 \pi\varepsilon\varepsilon_0 \cdot q / r^2$;
E = 4200 V/m	4200 V/m	$F = k \cdot q_1 q_2 / r^2$;
$E_0 = 8{,}84 \cdot 10^{-12} \frac{Кл^2}{Нм^2}$	$8{,}84 \cdot 10^{-12}$ F/m	$E = q / 4 \pi\varepsilon\varepsilon_0 r^2$;
π =3,14	3,14	$q_1 = q_2 = q$
q= ?		$k = 1 / 4 \pi\varepsilon\varepsilon_0$;
		$q = 4 \pi\varepsilon\varepsilon_0 r^2 E \cdot r^2$;
		$q = kE\, r^2\, E = k \frac{q}{r^2}$

Solution.
$q = 4.2 \cdot 10^3$ V/m $\cdot 4 \cdot 3{,}14 \cdot 8{,}84 \cdot 10^{-12}$ F/m $\cdot (0.9\text{ m})^2 = 3{,}7 \cdot 10^{-7}$ Kl.
The answer: q =$3{,}7 \cdot 10^{-7}$ Кл.

Issue 3. The moisture balance is maintained by the electrical resistance of the cotton. What is the electrical resistance of a 158-F cotton with a current density of 5 · 10-8 A/m2 and the surface of one cotton leaf about 60 cm3 and a voltage of 10 V?

Given:	**In Si:**	**Formula:**
		J = I / s; I = j s;
$j = 5 \cdot 10^{-8}$ A/m^2	$5 \cdot 10^{-8}$ A/m^2	I = U / R →U=IR=jsR;
s = 60 sm^3	$6 \cdot 10^{-1}$ m^2	U = jsR → R = U / j s;
U = 10 V	10 V	
R = ?		

Solution.
R = 10 B / $5 \cdot 10^{-8}$ A/m^2 $\cdot 6 \cdot 10^{-1}$ м^2 = $3{,}3 \cdot 10^8$ Om.
The answer: R =$3{,}3 \cdot 10^8$ Om.

In the 10th grade, the following topics can be addressed as a task for the home on the topic "Electricity".

Issue 1. Loss of moisture in the leaves of plants results in dehydration. Tashkent - The average surface area of the 6-grade cotton leaf is 35 sm^2 and what is the current strength of the vine with a density of 4 · 10-8 A/m^2?

Answer: I = $1{,}40 \cdot 10^{-17}$ A.

The issue 2. Increased levels of salivation in plants and increased soil salinity increase the moisture content. One of the easiest ways to identify these indicators is to give the plant electrical current. At what voltage is the electric field voltage 4200 V/m for a 180-sm Termez-7 grade cotton?
Answer: U = $7.56 \cdot 10^3$ V.
Answer: h = 1.43 m.

When solving problems in physics and environmental issues, the student relies on practice, that is, the materials of the region and the results of the experiment. This proves the importance of practical activities based on theoretical knowledge.

Issue 1. In cotton ecology, the status of cotton under the influence of electricity. Draw a diagram of the dependence of the electric field voltage on the electrical conductivity using the electrical conductivity of the cotton of Tashkent-3 grade is 10^{-11} Om^{-1} m^{-1}, using the voltage variation between $2 \cdot 10^{-8}$ A/m^2 and $5 \cdot 10^{-8}$ A/m^2.

Issue 2. To determine the moisture content of the plant body, use I, U, R, ρ physical quantities to determine the current voltage I and current intensity j.

The selection and solution of physically challenging problems in the environmental context give students the skills to research, reflect, think and act independently. In addressing these issues, the learner is looking for ways to directly link theoretical knowledge with practice. They have a deep and comprehensive approach to solving problems.

Problems in physics and environmental issues form the students' scientific outlook and begin to look for different ways to solve the problem. When solving problems in physics and environmental issues, the student relies on practice, that is, the materials of the region and the results of the experiment. This proves the importance of practical activities based on theoretical knowledge. Solving a problem is a factor in scientific research.

In the 10th grade, we will present the following issue of "Electric field voltage".

Issue 1. Depending on the electrical conductivity of the cotton planted in the saline area, its water regime can be determined. What is the voltage of the "138-F" cotton, with an electric field voltage of 4200 V / m and a height of 1.8m?

Given:	**In Si:**	**Formula:**
L = h = 1,8м E = 4200 В/м	E = U/L	U = EL= $4,2 \cdot 10^3$В/м 1,8 м = = $7,56 \cdot 10^3$ В.
U = ?		

The answer: $U = 7,56 \cdot 10^3$ B.

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