

THE DIFFERENCE BETWEEN TEACHING MOLECULAR PHYSICS AT SCHOOL IN RUSSIA AND UZBEKISTAN

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ANNOTATION

Differences in the number of lessons and their effectiveness in teaching the knowledge and skills of students in the field of molecular physics in schools of Uzbekistan and Russia. Teaching methods used in the formation of concepts in the field of molecular physics in schoolchildren and the work done to increase its effectiveness.

Keywords: molecular physics, thermodynamics, gas laws, physics teaching methods, course distribution.

INTRODUCTION

The study of molecular physics in the school course is repeatedly highlighted, given the importance and complexity of the material under consideration and the great educational value of this section. Introduction of students to the concepts of molecular physics in secondary schools of the Russian state is carried out in the physics course of VII and VIII grades. In 7th grade, 68 hours are allocated from 2 hours per week to study a physics course. It only takes about 6 hours to learn the basics of matter. This figure is given in the 6th grade physics course of secondary schools in Uzbekistan. (Appendix 1)

In the 7th grade physics course in Russian schools, students' initial knowledge of the structure of matter helps them to understand the atomic-molecular structure of matter, and in 8th grade, they learn about thermal phenomena later. The program for the study of the subject "Thermal phenomena" in VIII grade physics is 19 hours. Students learn concepts and phenomena such as internal energy and its modifications, amount of heat and specific heat capacity of a substance, heat of boiling and specific evaporation, changes in the state of matter, thermal phenomena and processes, heat the device and the principle of operation of the engines, internal combustion engine, steam turbine.

In addition, students' knowledge of molecular physics deepens and expands as they study in 10th grade. In class X, 40 hours are allocated for the study of molecular physics, which are distributed as follows:

1. Fundamentals of molecular kinetic theory - 30 hours.
2. Fundamentals of thermodynamics - 10 hours.

Concepts of molecular physics in Uzbek schools are divided into 6 hours in 6th grade (Appendix 1), 48 hours in 9th grade (Appendix 2), and 4 hours in 10th grade physics (Appendix 3). Students' knowledge of molecular physics deepens and expands in the ninth grade. In class IX, 48 hours are allocated for the study of molecular physics, which are distributed as follows:

1. Fundamentals of molecular kinetic theory - 16 hours. (2 hours of control work, 1 hour of practical training and 3 hours of problem-solving lessons)

2. Fundamentals of thermodynamics - 32 hours (3 hours of control work, 1 hour of practical training, 3 hours of laboratory work and 7 hours of problem-solving lessons)

There are two approaches to describing thermal phenomena and processes: thermodynamic and statistical. The thermodynamic approach is based on the concept of energy, while the statistical approach is based on the molecular-kinetic concepts of the structure of matter. Both approaches are the same in terms of application. Each has its own research topic. A statistical approach is used to study the basics of molecular kinetic theory, and a thermodynamic approach based on the concept of energy is used to solve the problem of converting energy into useful work. One of the teacher's tasks is to consider both approaches together in describing physical phenomena and processes. When using statistical or thermodynamic approaches, it is necessary to clearly distinguish between the knowledge obtained empirically and the knowledge obtained as a result of modeling the internal structure of matter.

The first topic of the section "Molecular Physics" is "Fundamentals of Molecular Kinetic Theory", which will be studied for 20 hours in secondary schools of Russia. Note that for the entire physics course taught in school, the study time is significantly reduced, which is considered to be a very short time allotted for studying this very important topic. Although the basic rules of molecular-kinetic theory of the structure of substances are discussed in Grade 7, many concepts have not been disclosed in terms of a statistical approach that is important for understanding the processes that take place in gaseous substances.

While studying physics in grades 7-8, students learned to explain a number of physical phenomena and properties in terms of the internal structure of matter. Nevertheless, most concepts (velocity of gas molecules, temperature, changes in aggregate states of substances, etc.) have been studied at the level of ideas. Such a study was not accompanied by quantitative calculations showing that the events were interrelated.

It should be noted that the study of molecular physics helps students to further develop abstract thinking, because when considering the structure of matter, molecules and atoms are represented only by the effects they exert. In order to imagine how they work and interact in matter, spatial-figurative thinking must be well developed.

Conclusion: The deductive method is used in the study of molecular physics, i.e. first the basic equation of theory is molecular kinetic obtained, then the ideal gas equation. The isothermal processes in gases are considered to be the result of the gas state equation. In addition, in the study of the first law of thermodynamics, its application to isothermal processes is analyzed. It should be noted that there is very little time left with a significant reduction in hours to consolidate the knowledge gained and develop skills. The teacher should take this into account and organize his / her activities in such a way that he / she makes the most of the time allotted to the lessons. The program is designed so that saturated and unsaturated vapors, crystalline and amorphous bodies, mechanical properties of solids: elasticity, strength, plasticity are studied in class X on the topic "Molecular Physics". In assessing the content and volume of material offered for study by students, the time allotted for study should be linked to the complexity of the content being studied. It should be noted that there is not enough time to consider all the issues of such an important branch of physics in depth and meaningfully.

Therefore, practice shows that knowledge is often formed superficially. The teacher is often unable to focus on solving problems that show the interrelationships of events and performing a system of laboratory work. There is only one way - to increase the number of hours spent on issues that are fundamental to the worldview.

(Appendix 1)

Calendar work plan for teaching 6th grade physics course

Class schedule	Section and topic name	Hour
5-lesson	Democritus, Ar-Razi, Beruni and Ibn Sina on the structure of matter	1
6- lesson	Molecules and their sizes	1
7- lesson	Interaction and motion of molecules. Brown movement	1
8- lesson	Diffusion phenomenon in different media	1
9- lesson	Molecular structure of solids, liquids and gases. Lab: Study of diffusion in liquids (done at home)	1

(Appendix 2)

Calendar work plan for teaching 9th grade physics course

Class schedule	Section and topic name	Hour
1-lesson	Molecular-kinetic theory of the structure of matter	1
2- lesson	Molecule size and mass	1
3- lesson	The amount of substance. Molar mass	1
4-lesson	Problem solving	1
5- lesson	Ideal gas	1
6- lesson	Temperature	1
7- lesson	The speed of motion of gas molecules	1
8- lesson	Problem solving	1
9- lesson	1- CONTROL WORK	1
10- lesson	Equations of ideal gas state	1
11- lesson	Isothermal process	1
12- lesson	Isobaric process	1
13- lesson	Isochoric process	1
14- lesson	Practical lesson-1. Evaluate the size of molecules	1
15- lesson	Problem solving	1
16- lesson	2- CONTROL WORK	1
17- lesson	Internal energy	1

18- lesson	Thermodynamic work	1
19- lesson	The amount of heat	1
20- lesson	Problem solving	1
21- lesson	Practical lesson-2. Study of heat balance in bodies	1
22- lesson	Lab 1: Determination of specific heat capacity of solids	1
23- lesson	Specific heat of combustion of fuel	1
24- lesson	The first law of thermodynamics	1
25- lesson	Problem solving	1
26- lesson	3- CONTROL WORK	1
27- lesson	Irreversibility of thermal processes. II law of thermodynamics	1
28- lesson	Laboratory work-2: Comparison of amounts of heat when mixing water of different temperatures	1
29- lesson	Internal combustion engines	1
30- lesson	The principle of operation of heat engines	1
31- lesson	Problem solving	1
32- lesson	4- CONTROL WORK	1
33- lesson	Heat engines and nature conservation	1
34- lesson	Problem solving	1
35- lesson	Properties of liquids	1
36- lesson	Wetting. Capillary events	1
37- lesson	Problem solving	1
38- lesson	Laboratory work-3: Determination of the coefficient of surface tension of a liquid	1
39- lesson	Crystalline and amorphous bodies	1
40- lesson	Mechanical properties of solids	1
41- lesson	Problem solving	1
42- lesson	5- CONTROL WORK	1
43- lesson	Melting and solidification of solids	1
44- lesson	Specific melting point of a substance. Melting and solidification of amorphous bodies	1
45- lesson	Evaporation and condensation	1
46- lesson	Atmospheric phenomena	1
47- lesson	Laboratory work-4: Determination of relative humidity	1
48- lesson	Problem solving	1

(Appendix 3)

Calendar work plan for teaching 10th grade physics course

Class schedule	Section and topic name	Hour
41-lesson	Irreversibility of thermal processes. Laws of thermodynamics	1
42- lesson	Adiabatic processes. FIK of heat engines. Carnot cycle	1
43- lesson	The importance of heat engines in human life. Heat engines and ecology	1
44- lesson	Problem solving	1

REFERENCES

1. N.SH.Turdiyev. "6th grade physics textbook" ∴ Toshkent 2019
2. H.P. Kyrgyzboyevich. A.Boydedayev et al "9th grade physics textbook" Gafur Gulom Publishing House Tashkent 2019
3. Annual work plan for grades 6-9-10
4. Khujanov.E.B PhD dissertation "Formation of physical concepts in general secondary school students on the basis of statistical methods".