

PROBLEMS OF TEACHING PHYSICS IN TECHNICAL UNIVERSITIES

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Abstract

This article focuses on the importance and role of physics in teaching chemical technology and nanotechnology. Key concepts such as molecular physics, thermodynamics, and electrochemical processes are discussed, highlighting their significance in the development of new materials and technologies. The integration of theoretical knowledge with practical skills through laboratory work and the application of chemical reactions to optimize technological processes is emphasized. The article also highlights the importance of innovative technologies and new materials in contemporary sciences.

Keywords: Physics education, chemical technology, nanotechnologies, chemical reaction, thermodynamics, electrochemical processes, molecular physics, spectroscopy, technological processes, energy efficiency.

Introduction

The problems of teaching physics in technical universities are clearly showing their importance all over the world. In particular, modern pedagogical approaches are used to integrate knowledge in physics and chemistry and train specialists who are needed for the production of new materials, based on laboratory work and experiments. In universities, emphasis is placed on the main directions and practical methods of teaching physics with chemical technologies. For example, the practical application of physics in areas such as electrochemistry, molecular physics, spectroscopy and nanotechnology helps to provide students with the necessary knowledge for the production of new materials [1-5].

Laboratory works to students experience through concepts lighting and practical results to take help Electrolysis processes, molecular physics , optics and thermodynamic such as education topics working on the way out usable literature is also generalized and modern scientific of affairs relevance shows . To achieve such indicators and high efficiency, it is important to update each course in higher education institutions and provide students with knowledge in accordance with the requirements of the present day. Keeping in touch with technologies and production processes, increasing students' experience in the use of new materials and technologies should be one of the main goals of higher education [6-8].

Today, technologies are developing faster than ever, and the importance of physics and chemistry in training a new generation of specialists is very great. Therefore, teaching these subjects in higher education institutions is becoming a very complex and responsible process.



In this article, we will discuss the main problems of teaching physics in universities, its impact on chemical technology, and approaches aimed at forming not only theoretical but also practical knowledge.

Methodology

Thermodynamics of chemical processes - understanding the heat effects of chemical reactions and the principles of thermodynamic equilibrium helps to optimize reaction conditions and select optimal process parameters. For example, studying the changes in enthalpy and entropy during reactions is of great importance [9].

Electrochemistry - electrochemical processes are widely used in industry, for example, in the production of electrolytes, metals, and other important products. Understanding electrochemical phenomena such as oxidation-reduction reactions and electrolysis allows the creation of new technologies and the improvement of existing ones.

Molecular physics and molecular structure theory - the study of the molecular structure of substances and their interactions helps to understand the properties of chemical compounds, which is important in the development of new materials and technologies. An example of this is the study of the structure of polymers and their behavior during synthesis and processing.

Optics and spectroscopy - optical analysis methods such as infrared and ultraviolet spectroscopy are widely used in analyzing the composition and structure of chemical compounds. Understanding the basics of these methods helps in developing new analytical methods and controlling product quality [10].

Let's analyze the integration of chemical technology and physics. To solve problems in the field of chemical technology, it is necessary to rely on all the theoretical and practical foundations of physics. For example, knowledge of electrochemistry and molecular physics is important in the development of new materials. Physics science the basics understanding , new technological processes create and existing ones to improve opportunity In this process , students physics science theoretical concepts to practice implementation to reach studies New approaches to teaching physics in higher education help students acquire not only theoretical but also practical knowledge. Such approaches are especially important in the study of technologies and production processes. Topics such as the kinetics of chemical reactions, thermodynamics, electrochemical processes, molecular physics and spectroscopy help students understand the relationship between physics and chemical technology [11].

Results and Discussion

The following examples and laboratory work demonstrate the connection between physical science and chemical technology, and are used in the development of new materials.

Electrochemical reactions and electrolysis. Electrochemical reactions and electrolysis process in practice. In this laboratory, you can study the operation of chemical reactions in the forward or reverse direction and their energetic analysis. If we analyze the laboratory work, we will learn about the reaction: practical application of electrolysis, equipment: electrolysis equipment, electrodes, electrolytes (for example, an aqueous solution of sodium chloride), theoretical knowledge to be demonstrated: general rules of oxidation-reduction reactions, laws of energy conversion. As a result, such students will analyze various parameters of the



electrolysis process (for example, current strength, temperature, and the effect of electrolytes) and control the release of chemical products.

Molecular Physics: Thermodynamics of Molecules. Laboratory work is performed to study the dynamic properties of molecules and to apply the concepts of molecular physics. In laboratory work, reaction: the laws related to the movement of molecules in chemical reactions and the energy of molecules, equipment: thermometers for measuring temperature, temperature control equipment, precise instruments for calculating energy, theoretical knowledge is demonstrated Through enthalpy, entropy and kinetic energy of the earth, thermodynamic laws, states of molecules and their interactions are studied. As a result, students can see the movement of molecules in different phases and their energy decreases or increases.

Optics and spectroscopy: materials structure to study Optical methods and spectroscopy methods through new of materials molecular and atomic structure Laboratory in learning their work place big. Laboratory at work reaction: New polymers or metal mixtures spectroscopic analysis, equipment: Spectroscopes, infrared and ultraviolet spectroscopy equipment, optical instruments, displayed theoretical knowledge Polymers structure , polymers synthesis and working exit in the process changes , materials spectroscopic analysis they learn. As a result Students new of materials spectroscopic features analysis they do , their molecules between mutual the impact and structure obvious their views This method is possible . new materials working in the release important importance has .

Practice in their classes from physics use . Chemical in technology new materials create in the process from physics of use importance understanding students practical skills to increase help gives. Practice lessons , scientific research and laboratory works students to the theoretical knowledge of science rules to practice implementation to grow opportunity For example , the new materials in creation thermodynamics , molecular structure and Practice in their classes from physics use , chemical in technology new materials in creation students theoretical knowledge to practice implementation in the process of important importance Below , the new materials create in the process physics from science to use related clear example and their solutions quoted :

Conclusion

New approaches to teaching physics in universities are mainly aimed at combining theoretical knowledge with applied sciences. In areas such as electrochemistry, molecular physics, spectroscopy and nanotechnology, combining students' practical and theoretical knowledge is important for increasing their high efficiency in the production of new materials. Teaching students to use physics in the field of chemical technology plays an important role in the development of new materials and technologies by giving them practical experience. Laboratory work in areas such as electrochemistry, molecular physics, spectroscopy and nanotechnology allows students to apply the theoretical principles of science in practice. This is due to the fact that in turn , to them new , modern materials working in the release help It is possible to provide a list of literature and several guides and information about scientists for article production based on examples and laboratory work taken on this topic. This will help students physics science chemical technologies with integration deep understanding opportunity gives. Students for physics and chemical technology in the field practical



experiments and laboratory work, to them theoretical knowledge in practice application opportunity Electrochemistry, molecular physics, spectroscopy and nanotechnologies such as in directions scientific research and manuals to students new technologies working on the way out help gives. The practical application of physics in practical classes helps students create new materials in chemical technology and determine their properties. Using thermodynamics, molecular physics, spectroscopy and nanotechnology, students gain practical experience in synthesizing new materials and learn to apply the theoretical principles of science in practice. Chemical technology and physics play an important role in teaching in universities, training future specialists. Knowledge in each area of physics, chemical reactions, thermodynamics, molecular physics and electrochemistry is important in creating new technologies and improving existing ones. Therefore, teaching a physics course requires a very complex and integrated approach. To achieve this goal, it is important to combine physics with chemical technology and provide students with practical skills to improve their level of expertise.

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