FURTHER DEVELOPMENT OF THE METHODOLOGY OF PREPARING FUTURE ENGINEERS TO SOLVE GENERAL TECHNICAL PROBLEMS FROM PHYSICS TO THE PROFESSION

Urinov Shukhrat Suyunovich
Jizzakh Polytechnic Institute
shuhraturinov1980@gmail.com

Abstract:	Keywords:
In this article, the ideas about the possibility of further development of the methodology of solving general technical problems in the training of future engineers are described.	explanatory-illustrative, reproductive, problematic statement, heuristic, research, statistical physics, thermodynamics, independent experts, dialectical result.

Introduction

It supports the formation of physical knowledge, the development of professional competences, the formation of a scientific worldview aimed at educational and professional goals, and the development of thinking and independence.

In the learning management model, this communicative relationship in the conditions of subject-subject mutual communication, the professor-teacher manages the learning of future engineers. But in order to manage it, it is necessary to have a good understanding of the communicative relationship between unity, generality and limited generality, that is, the principles and approaches between the empirical basis, theoretical core and deductive (dialectical) results of the scientific and educational methods of fundamental physical theory.

In our opinion, if the content and process aspects of learning through study are brought in accordance with the competence-based approach and the principle of continuity, such components include not only diagnosis, but also the correction of the obtained results, ensuring the effectiveness of management. serves.

To achieve the main goals set in physics education, it is necessary to perform the following algorithmic sequence:

- Teaching physics teaching methods (explanatory-illustrative, reproductive, problem statement, heuristic, research), forms (lecture, seminar, laboratory work) and tools (verbal, demonstration, special, technical, computer) Choosing an effective technology of knowledge through inclusive reading;
- Skillful management of learning through reading. In accordance with the logical chain of scientific knowledge, the empirical foundations of physics, its core and requirements for deductive results are clearly manifested (training of a competent engineer); diagnosing the

results of the process of learning through reading in all its stages and performing the next stages of physical education.

The following tasks are solved in the course of practical physics training:

1) to determine the location of the structure of the fundamentals of thermodynamics as the laws of physics and the system of proven scientific knowledge;

2) to reveal the logical interconnections of the elements of the foundations of thermodynamics as a fundamental physical theory;

3) to identify the logical difference between empirical and theoretical thermodynamic laws;

4) show the characteristics of models of thermodynamic systems used by students in professional activities.

The physical problem is aimed at the acquisition of knowledge from physics and the development of thinking. Solving problems is a process that shows the creative activity of a person who solves this problem [1].

Before the practical training in physics begins, the academic group is divided into three subgroups (expert groups): “statistical physics”, “thermodynamics” and “independent experts”.

Solving physical problems:

a) realizes the function of scientific and educational knowledge, that is, it helps to form physical concepts more clearly, to understand and master the content of education in all aspects;

b) application of physical laws to explain natural phenomena and solve practical problems forms and strengthens knowledge, skills and abilities, necessary professional competencies. In this regard, theory and practice are integrated;

c) enables implementation of the technical principle in teaching physics (choosing and solving technical problems);

g) establishment of inter-disciplinary integration relations is one of the effective ways to solve problems in physics;

d) allows to repeat the material learned in physics, to control knowledge [2].

Below are the career-oriented solutions of molecular physics and thermodynamics:

1. In a cylinder with a capacity of 12 liters $8.1\cdot10^6\,\frac{N}{m^2}$ pressure and 17^0C nitrogen filled at temperature. How much nitrogen is in the cylinder?

Given $V=12l=12\cdot10^{-3}m^3$, $P=8.1\cdot10^6\,Pa$, $T=273+17=290K$, $M_{azot}=28\cdot10^{-3}\,\frac{kg}{mol}$ Must find $m=?$

Solution: Calculate the mass of nitrogen according to the Mendeleev-Claypeyron equation $PV=\frac{m}{\mu}RT$ in this $m=\frac{PV\mu}{RT}$ we count. Answer: $m=1.13kg$.

2 If $p=200\ mm\,simust$ average quadratic speed of a hydrogen molecule at pressure $2400m/s$ is equal to, find the number of hydrogen molecules. Given

$P = 266.6Pa$, $\vartheta_{kv} = 2{,}4 \cdot 10^3 \frac{m}{s}$. $\mu = 2 \cdot 10^{-3} \frac{kg}{mol}$, Must find $n = ?$ Solution $P = nkT$, $k = \frac{R}{N_A}$ from the equation: $P = n\frac{R}{N_A}T$, from this $n = \frac{PN_A}{RT}$. On the other hand $\vartheta_{kv} = \sqrt{\frac{3RT}{\mu}}$ if we raise it to a two-sided square $\vartheta_{kv}^2 = \frac{3RT}{\mu}$, from this $RT = \frac{\vartheta_{kv}^2\mu}{3}$ $n = \frac{3PN_A}{\vartheta_{kv}^2\mu}$

if we calculate by the formula $n = 4.2 \cdot 10^{24} m^3$ comes from

3. A closed container $1m^3$ with a capacity of 0.9 kg of water and 1.6 kg of oxygen. If it is known that water turns into steam at a certain temperature, what is the pressure in the tank $500^0 C$ at this temperature?

Given: $V = 1\,m^3$, $m_1 = 1.6$ kg, $m_2 = 0.9$ kg, $t = 500^0 C \Rightarrow T = 273 + 500 = 773K$.

Must find $P = ?$

Solution: According to Dalton's law $P = P_1 + P_2$ (a) in this P_1 - normal pressure of oxygen $\left(\mu_1 = 32 \cdot 10^{-3} \frac{kg}{mol}\right)$, P_2 - normal water vapor pressure $\left(\mu_2 = 18 \cdot 10^{-3} \frac{kg}{mol}\right)$ is expressed as follows: $P_1 = \frac{m_1RT}{\mu_1V}$, $P_2 = \frac{m_2RT}{\mu_1V}$ (b). (a) from (b) according to $P = P_1 + P_2 = \frac{m_1RT}{\mu_1V} + \frac{m_2RT}{\mu_2V} = \frac{RT}{V}\left(\frac{m_1}{\mu_1} + \frac{m_2}{\mu_2}\right)$ if we count $P = 640 \cdot 10^3 Pa$ comes from.

4. $1.5 \cdot 10^5 N/m^2$ was under pressure $2\,l$ What is the energy of thermal motion of diatomic gas molecules in a container?

Solution: $V = 2l = 2 \cdot 10^{-3} m^3$, $P = 150 \cdot 10^3 Pa$

Must find: $W = ?$

Solution: The Mendeleev-Claypeyron equation for a gas in this state: $PV = \frac{m}{\mu}RT$ (a). Internal energy of a gas $W = \frac{i}{2}\frac{m}{\mu}RT$ (b). (a) from (b) according to: $W = \frac{i}{2}PV$. From this equation, the desired quantity is calculated. Answer: $W = 750J$

5. 1) $V = const$ va 2) $P = const$ find the specific heat capacity of oxygen.

For oxygen a) $V = const$ va b) $P = const$ it is necessary to find the specific heat capacity C for

Solution: $V = const$ for the case $C_v = \frac{i}{2}R$, from this i=5 for $C_v = \frac{5}{2} \cdot 8.31 = 2.5 \cdot 8.31 = 20.8 \frac{J}{mol \cdot K}$, $C = \mu c$, or $c = \frac{C}{\mu}$ because it was:

$C_v = \frac{c_v}{\mu} = \frac{20.8}{32 \cdot 10^{-3}} = 650 \frac{J}{kg \cdot K}$. It is calculated in the same way: $C_p = C_v + R$ or $C_p = \frac{C_v \mu + R}{\mu} = 910 \frac{J}{kg \cdot K}$.

The Conclusion

If conducting experiments, observing, synthesizing, formalizing and modeling in practical training form an empirical basis, moving from it to the theoretical core involves the application of the laws of physics. takes Achieving a dialectical result implies the development of the necessary professional competencies of future engineers through integrated interdisciplinary training. Based on these, a methodology for solving problems related to the basics of molecular physics and thermodynamics was developed; In our research, we have improved the methodology of preparing undergraduate students to solve general technical problems from physics to profession. In the process of solving such problems, engineers think, observe and try to make the right decision. All this encourages the formation of creative feelings in students and ultimately ensures the effectiveness of education. These methods serve to form professional competencies of future engineers.

References

1. Носов Ю.Р. Оптоэлектроника: исторический аспект. - В кн. «Базовые лекции по электронике», т. 2. Твердотельная электроника. — М.: Техносфера. -2009, с. 171-205.
2. Карпенко Г.А. Роль индивидуальных заданий по курсу физики в формировании творческих способностей специалиста. — Материалы IX Международной конференции «Физика в системе современного образования» (ФССО-07). - СПб.: Изд-во РГПУ им. А.И. Герцена, 2007, т. 1, С. 234-235
3. O‘rinov Sh.S. Vibrations of Impurity Iron Ions in Fluorides // In Volume 6 of The Peerian Journal ISSN (E): 2788-0303, May 2022.
4. O‘rinov Sh.S. Talabalarni fizikadan kasbga yo‘naltirilgan umumtexnik masalalarni yechishga tayyorlash // TA’LIM, FAN VA INNOVATSIYA ma’naviy-ma’rifiy, ilmiy-uslubiy jurnal 2023-yil 3-son. 304-b.
5. O‘rinov Sh.S. General didactic principles of preparation for solving general technical problems from physics to profession // “Raqamli energetika tizimini yaratishning istiqbollari, muqobil energiya olishning muammolari va yechimlari-2023” Xalqaro ilmiy-amaliy konferensiyasining ilmiy maqola va tezislari to‘plami. Jizzax, 2023 yil 19-20 may 513-518 bet.