

## PHOTO EFFECT EVENT PHOTONS AND THEIR CHARACTERISTICS

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**ABSTRACT**

This article discusses the advantages of using interactive methods in quantum physics topics.

**Keywords:** *Physical processes, theoretical knowledge, Correct placement, photoeffect, photoelectric effect, X-ray tube, anode voltage.*

**INTRODUCTION**

We know that there are different approaches by educators to provide students with simple and fluent teaching materials so that they can easily apply their theoretical knowledge in practice. The use of interactive methods in the study of the laws of physics, imagination, analysis, physics dictation "Correct placement" "Why" is shown in the laws in several examples. The word interactive is derived from the English word and is a way to solve an activity or problem through interaction, communication, interaction, discussion. We see that the application of interactive methods and innovative technologies "Information Teaching" in the educational process in high places gives good results

Educational technology is an effective way to use selected methods and tools to achieve educational goals, to educate students and to form and develop scientific concepts. organization of the process, the product - a graduate of higher education with sufficient knowledge, skills and abilities, educated, mentally developed graduate - a student. [1]

Indeed, it is important to convey the laws of physics to students in an understandable way, depending on the knowledge and pedagogical skills of the teacher, and to apply the methods knowing the level of knowledge of the students. [1-2]

It is well known that in order to better explain the topic to the student, physics dictation "Correct placement" "Why" interactive methods and problem-solving examples in order to develop problem-solving skills on the topic also give good results.

**METHODOLOGY**

Photoeffect phenomenon. The topic of photons and their characteristics, interactive methods "Physics dictation" Correct placement "" Why ", an example of problem solving.

**OUTCOME ANALYSIS**

1. It is much better to use inertial methods in the analysis of physical laws if the reader reads the text in order to imagine the physical processes in order to understand the topic.

2. The "Physics Dictation" method is very effective in studying the rules, formulas, laws, formulas and their physical meanings that the reader should pay attention to while reading the text.

3. It is advisable to use the method of "why" of physical processes, so that the student has theoretical and practical knowledge.

4. Compatibility tests on the topic are important for the student to know the diversity of physical formulas in solving a problem on the topic.

7. The use of sample problems on the topic gives good results in strengthening the theoretical and practical knowledge of the student.

9. Rules that a student can pay attention to when solving a problem in quantum physics.

1. Understand, imagine, and analyze the condition of the matter
2. Convert physical quantities to the basic units of the problem condition
3. Write to know the general formula of the problem
4. Derivation of the working formula from the General formula based on the condition of the problem.

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Study of the photoelectric effect (Hers experiment) using the interactive method "Physics dictation"

Basic phrases on the topic

1. Who discovered the phenomenon of the photo effect.
2. What is an electrometer?
3. Explain the zinc plate
4. What is the deflection of the electrometer arrow
5. How do you explain that the electrometer arrow does not change when we illuminate the zinc plate

with an electric arc

6. What is the internal photoeffect
7. What is the external photoelectric effect [3]

Answers:

1. Discovered by the German physicist Gers.
2. A device that indicates if there is an electric charge
7. The state of electron emission from a substance under the influence of light is called the external photoeffect. [3-4]

Study of the use of Stoletov's device in the examination of the external photo effect using the method of "Cluster".

1. Stoletov device, Vacuum, window light source, cathode, anode current meter, voltmeter,...

Using the "Correct Placement" method based on the "Cluster" method

In this method, the student pays attention to the sequence of each process.

1. Light source
2. Light falls through window D.
3. A zinc plate with a cathode function
4. A battery
5. A potentiometer that changes the voltage value
6. The voltage between K and A is measured using a V voltmeter. [5-6]

The "why" scheme in the study of the graph of the dependence of the photocurrent on the anode voltage

It is important to know, analyze, and apply the laws of physical processes in general. Therefore, discussing and comparing physical processes requires the student to think broadly and apply the laws of physics.

1. Why? even if the voltage is zero, the current is not equal to zero
2. Why? The maximum value of the current is called the saturation current.
3. Why? Changing the poles of the battery will reduce the current.
4. Why? Brake and stop voltage required

## Answers

1. The reason is that as light falls on the cathode, the electrons that fly out of the cathode move towards the anode, resulting in a current even if there is no voltage between the cathode and the anode.

2. The reason why the current reaches its maximum value when all the electrons emitted from the cathode reach the anode under the influence of light is called saturation current. means. [5-6]

Application of the method of physical dictation on the topic "Photon and its characteristics"

Dictation writing gives students formulas, events, and rules on the topic, and students are required to demonstrate their knowledge of them. For example, if there is an event, it should be covered, if it is expressed by a formula, the formula should be written and explained, examples should be given, rules of the formula should be given. Physical dictation on the topic "Photon and its characteristics" on the following basic phrases

1. Talk about photon energy
2. The formula for the dependence of photon energy on frequency and wavelength
3. Mass of a photon at rest
4. Mass of motion
5. Is it possible to measure the mass of a photon, and why?

1. What is the wavelength (nm) of ultraviolet radiation with a pulse of  $(3 \cdot 10^{-27} \text{ N}\cdot\text{s})$   $h = 6,62 \cdot 10^{-34} \text{ J}\cdot\text{s}$

Given Calculation

$$P = 3 \cdot 10^{-27} \text{ N}\cdot\text{s} \quad \lambda = h / P$$

$$h = 6,62 \cdot 10^{-34} \text{ J}\cdot\text{s}$$

$$\lambda = (6,62 \cdot 10^{-34}) / (3 \cdot 10^{-27}) = 2,21 \cdot 10^{-7} \text{ m} [7-8]$$

2. What is the frequency of radiation with a photon momentum of  $6,62 \cdot 10^{-28} \text{ N}\cdot\text{s}$  ( $G_s$ )  $h = 6,62 \cdot 10^{-34} \text{ J}\cdot\text{s}$

Given Calculation

$$P = 6,62 \cdot 10^{-28} \text{ N}\cdot\text{s} \quad P = h\nu / c$$

$$h = 6,62 \cdot 10^{-34} \text{ J}\cdot\text{s} \quad \nu = \frac{Pc}{h} = \frac{3 \cdot 10^8 \cdot 6,62 \cdot 10^{-28}}{6,62 \cdot 10^{-34}} = 3 \cdot 10^{14}$$

$$\nu = ?$$

[7-8]

3. Find the maximum frequency (GHz) of a photon that can be irradiated in an X-ray tube with an anode voltage of 8 V.

Given Calculation

$$U = 8 \text{ V} \quad h\nu = Ue$$

$$E = 1,6 \cdot 10^{-19} \text{ J} \quad \nu = \frac{Ue}{h} = \frac{8 \cdot 1,6 \cdot 10^{-19}}{6,62 \cdot 10^{-34}} = 1,93 \cdot 10^{15} [7-8]$$

## CONCLUSION

Photoeffect phenomenon at work. Photons and their characteristics. It was concluded that it is important for the student to see and hear physical processes in order to understand, imagine and analyze physical processes, as well as to use interactive methods in understanding, analyzing and consolidating theoretical knowledge.

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