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Исследования Гипотезы Эксперименты

Методические указания

*Рекомендовано
Редакционно-издательским советом университета
для магистрантов и аспирантов специальностей
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Цель методических указаний – обучение магистрантов и аспирантов естественных факультетов устной и письменной речи на английском языке.

Методические указания состоят из разделов, куда включены научно-популярные статьи из зарубежных периодических изданий, а также упражнения и задания, стимулирующие речевую деятельность на английском языке. Содержится справочный материал и рекомендации по написанию и оформлению научных статей.

Методические указания составлены в соответствии с требованиями действующей программы по английскому языку для неязыковых специальностей высших учебных заведений.

Предназначены для магистрантов и аспирантов, обучающихся по специальностям: магистратура 510400 Физика, магистратура 510100 Математика (дисциплина "Английский язык", блок ГСЭ), очной формы обучения.

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Part I. Reading and summarising information

Text 1.

Electricity is not a Form of Energy

By William Beaty, 1999

Before you read the text

- 1. How many forms of energy do you know?***
- 2. Define potential energy and kinetic energy.***
- 3. What is the principle of energy?***

Many encyclopedias, dictionaries and textbooks contain very clear statements about the nature of Electricity. They say this:

- Electricity is a type of energy.***
- Electric current is a flow of energy.***

The above statements are wrong. Yes, electrical energy does exist. However, this energy cannot be called “Electricity”, since Coulombs of electricity are very different from Joules of electromagnetic energy. They’re two different things, so the energy and the charge cannot *both* be electricity. It’s not too difficult to demonstrate the mistake. Below is a collection of simple facts which show that *Electricity*, the stuff that flows within copper wires, is not form of energy.

In a simple electric circuit, the electricity *flows slowly in a complete circle*, while the energy moves differently. The electrical energy flows rapidly one way, going from the source to the load and not returning. The energy does not follow the circular flow of electricity; electricity and electrical energy are two different things. No charges of electricity are gained or lost as the charges circulate within the wires, yet batteries create electrical energy from chemical energy and light bulbs destroy the electrical energy as they convert it into light. Electrical energy takes a rapid one-way path from battery to bulb and then leaves the circuit as light while electricity flows around (and around and around) a closed-loop path and none is lost.

In a lightbulb, charges of electricity flow *through* the filament and back out again. None are lost. This electricity enters the light bulb through one wire and the same *amount* of electricity leaves through the other wire. Yet the energy doesn't act like this at all. The light bulb uses up the electric energy: the electrical energy flows into the bulb along both wires and is transformed into heat and light. The electrical energy does not come back out through the second wire and return to the battery.

In an AC system, the charges of electricity move back and forth over a short distance. In other words, they sit inside the wires and vibrate. That's what "Alternating Current" or AC is all about. The electricity *does not* move forward at all (if it did, that would be a direct current or "DC"). Yet as these charges of electricity are wiggling back and forth, at the very same time the electrical energy moves forward rapidly. Only the electricity "alternates." The electrical energy does not; the energy flows continuously forwards as waves.

If this is confusing, consider sound waves which move through collections of air molecules. Electricity is like the air which is vibrating while the electrical energy is like sound waves which fly through the air. Sound and air are two different things, just as energy and electricity are two different things.

In the above statements I am using the word "electricity" used in the way scientists have used it since Electricity was first investigated. I am using the word "electricity" to name the stuff that flows inside the wires, where a quantity of electrons is a quantity of electricity and where a flow of electricity is called "an electric current".

Most people use the word "electricity" in a totally different way. They begin by defining the word "electricity" to mean electrical energy. Electric companies do this (think of kilowatt-hours of electricity.) So do many dictionaries and encyclopedias. This causes endless confusion. Physicists try to tell us that the charges of electricity are not energy and that a flow of charges is not a flow of energy. But then what is an electric current? Under the definition of "electricity" used by all non-scientists, an electric current *IS NOT* a flow of electricity!

Note: my above statements about electricity and energy would be accepted by most scientists throughout history, including Ben Franklin, Michael Faraday, James Maxwell and Robert Millikan. I am using the