

AN ELECTRIFYING LIFE

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Michael Faraday was an extraordinary scientist. He is rightly termed as the greatest science experimentalist in history. Faraday was born in England in 1791 and died in 1867 at the age of 75. There were no Nobel prizes for science in those days otherwise Faraday would easily bagged 3 or 4 Nobel prizes for his outstanding contributions in diverse fields of science – discovery of the Laws of Electromagnetic Induction, Laws of Electrolysis, and discovery of Benzene, Diamagnetism, the Bunsen burner, Polarization of light, Faraday's Cage etc.

Unlike many bright scientists who have no moral compunctions doing research on war weapons and missiles which kill human beings, Faraday was a pacifist. In 1853, when Faraday was asked by the British government to advice on the production of chemical weapons he refused to participate on ethical grounds.

His family was not well off. His father- James Faraday was a poor village blacksmith. So, after a minimalist school education Michael was apprenticed for seven years to a bookbinder. Here he read many interesting books which kindled his interest in science. Faraday developed a rapport with Sir Humphry Davy an eminent English chemist. Sir Davy gave him passes to attend free lectures at the Royal Society.

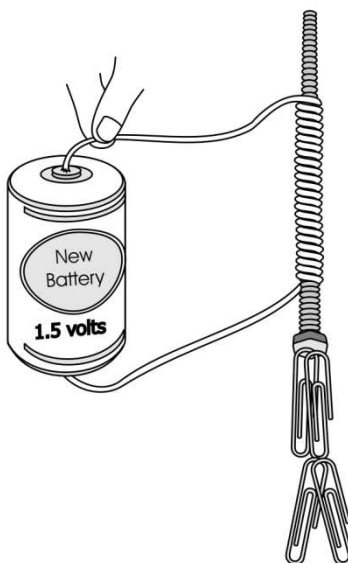
Faraday took extensive notes of the lectures and hand wrote all of Davy's lectures in a three hundred page book. Davy was duly impressed with this present. After Davy's eye got damaged in an accident, he employed Faraday as a secretary. Later in 1813, when a lab assistant was fired at the Royal Institution, Faraday got a job of a Chemical Assistant, ostensibly to clean test tubes! By 1825 he had worked his way up to becoming the laboratory director, and in 1833 he was made a professor of chemistry. Faraday built the first dynamo, a copper disk that rotated between the poles of a permanent magnet and produced an electromotive force (something that moves electricity). His work in electromagnetic induction led to the development of modern motors, dynamos and generators.

Faraday was an excellent experimentalist who conveyed his ideas in clear and simple language. However, his mathematical abilities did not extend beyond simple algebra. It was James C. Maxwell who took Faraday's work and consolidated it with a set of equations that lie at the base of all modern theories of electromagnetic phenomena.

The unit of capacitance “Farad” is named in Faraday’s honor as is the charge on a mole. Einstein kept a photograph of Faraday on his wall alongside that of Newton and James C. Maxwell.

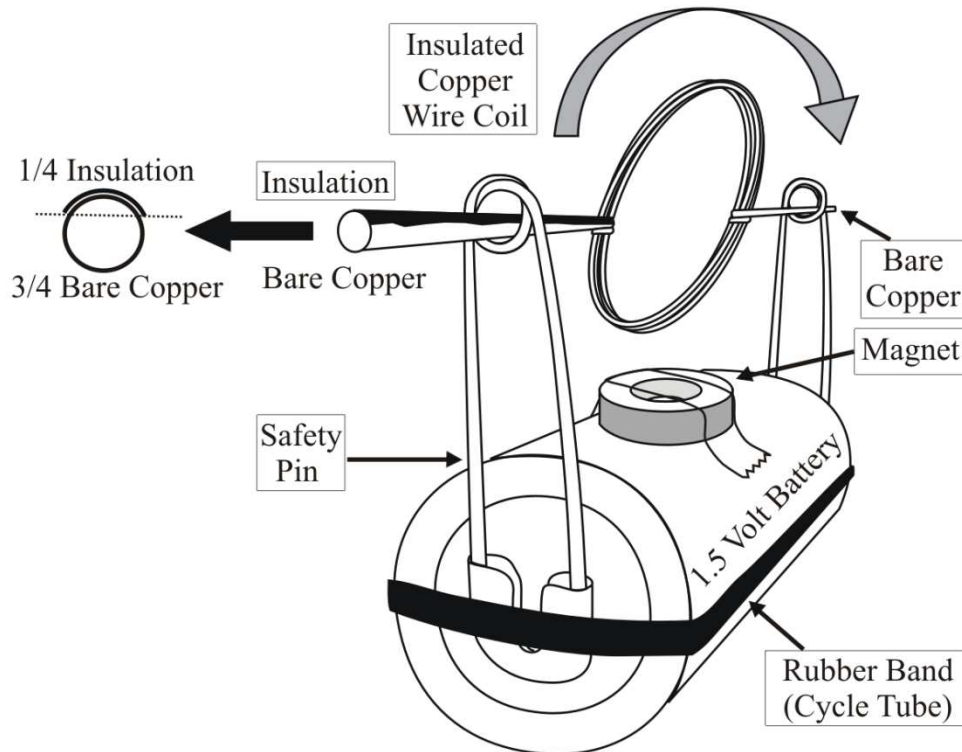
In Faraday’s time all research was funded by the nobility. Faraday had no kids but was very fond of children. He often borrowed his nephews and nieces when travelling abroad. Faraday’s great love for children made him conceive of the Christmas Lecture Series for popularizing science amongst children. Between 1827 and 1860, Faraday gave the Christmas lectures a record nineteen times which included the famous *Chemical History of the Candle* lecture-demonstration. During his lifetime Faraday rejected a Knighthood twice and refused to become the President of the Royal Society.

Make an Electromagnet



Faraday’s most significant contribution which made a lasting impact on science and technology was the discovery of the laws of electromagnetism. To understand them you can make a simple electromagnet by winding 50 turns of insulated copper wire (used for motor rewinding) on a thick steel nail or screw. Scrape the insulating varnish from the ends of the coil and attach them to the ends of a 1.5-volt torch battery. The steel screw will become an electromagnet. Steel paper clips will now be attracted to the screw head. More the number of turns on the coil, more the voltage the more powerful will be its magnetic power.

Simple Electric Motor

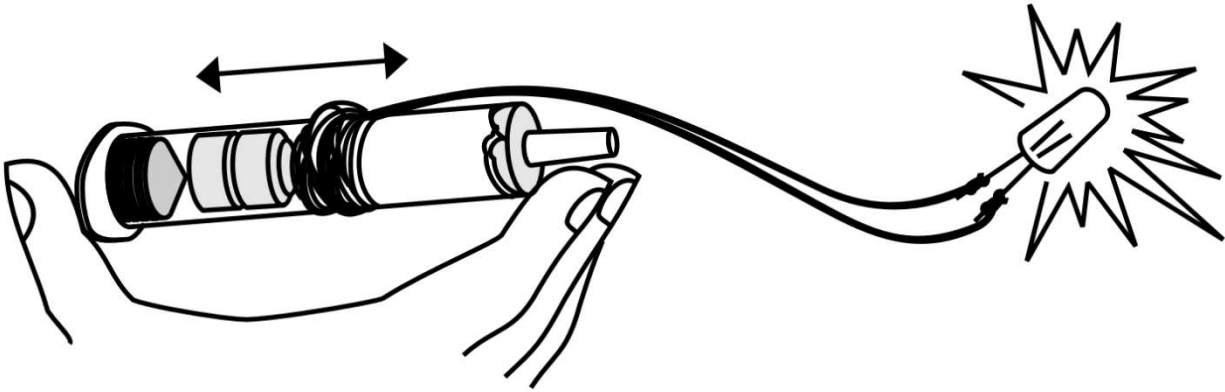


At home electric motors are used in many gadgets – fan, cooler, fridge, mixer, washing machine etc. Modern life would come to a standstill without the electric motor. If you have the materials this simple electric motor can be made in 15-minutes. You will need a new 1.5-volt battery, two long safety pins, a 1-cm wide rubber band from an old cycle tube, 1-meter of 20-gauge (indicated the thickness) insulated copper wire used for motor rewinding and a magnet.

First wind the wire on the battery to make a spring with 10 turns. Remove the spring and tie two knots such that its two arms jut out along the diameter. Scrape one arm completely of the insulation to see shining copper. Scrape only 3-sides of the other arm so that there is insulation on the top as shown. This insulation will act like a switch and make / break the circuit in every rotation of the coil. This switch is called a “brush” or “commutator” of a D.C. motor. Now assemble the motor and slip in the coil. The coil will keep spinning to your utter delight. (See link <http://www.youtube.com/watch?v=vSPFwibREUg>)

Don't give up if you don't succeed the first time. Michael Faraday tried over five times before he got his electric motor right!

Make a Generator



This generator is also simple to make. The most important thing will be to get hold of two strong neodymium magnets from a science store. You will also need insulated copper wire (30-gauge), and a LED. Place the magnets inside the barrel of an old syringe. The magnets should be loose and move freely inside the barrel. Place the rubber piston of the syringe at the end as a stopper. Now wind 500 turns of thin insulated copper wire on the syringe barrel. Scrape the insulation from the two ends of this coil and attach them to a LED.

Now hold the syringe and shake it. The magnets will move left and right. This moving magnetic field will produce current in the coil and light the LED. This simple science model is truly empowering – for you can generate a small current and light your own LED.

(See link <http://www.youtube.com/watch?v=sS2BdyCvWzE>)

