

MICHAEL FARADAY



Michael Faraday was born on September 22, 1791 in Newington, England. He was one of four children with only the most basic of school education and educated himself. At fourteen he became an apprentice to a local bookbinder and bookseller George Riebau and, during his seven-year apprenticeship, he read many books, including Isaac Watts' *The Improvement of the Mind*, whose principles and suggestions he enthusiastically implemented. He developed an interest in science, especially in electricity and began attending the lectures of Sir Humphry Davy in 1810. . In December 1811, he impressed Davy by sending him Davy a three hundred page book based on notes taken during the lectures including exact drawing of Davy's apparatus. On 1 March 1813, Davy appointed him his Chemical Assistant at the Royal Institution. He was elected a member of the Royal Society in 1824, appointed director of the laboratory in 1825; and in 1833, he became the first Fullerian professor of chemistry for life without having to deliver lectures.

He successfully converted electrical and magnetic forces into continual mechanical movement. One of his inventions was the first transformer. He also discovered magnetic optical rotation, invented the dynamo (a device capable of converting electricity to motion) in 1821, and discovered electromagnetic induction in 1831. His studies of the magnetic field around a conductor carrying a DC electric current established the basis for the electromagnetic field concept in physics. He first suggested that current produces a electric "tension" which produces lines of force and experimented with dielectrics in a capacitor. His inventions of electromagnetic rotary devices formed the foundation of electric motor technology, and it was largely due to his efforts that electricity became viable for use in technology. In 1845, he discovered that many materials exhibit a weak repulsion from a magnetic field, a phenomenon he named diamagnetism.

He continued Davy's work in electrochemistry formulating the laws of electrolysis. The first law is that the amount of chemical reaction that occurs at the electrode is proportional to the quantity of current that passes. The second law of electrolysis states that the passage of a fixed quantity of electricity produces amounts of two different substances in proportion to their chemical equivalent weights.

He discovered benzene, investigated the clathrate hydrate of chlorine, invented an early form of the Bunsen burner, and the system of oxidation numbers. In addition, he popularized terminology such as anode, cathode, electrode, and ion. He was the first to report what later came to be called metallic nanoparticles. In 1847 he discovered that the optical properties of gold colloids differed from those of the corresponding bulk metal. This was probably the first reported observation of the effects of quantum size, and might be considered to be the birth of nanoscience.

His statue stands in Savoy Place, London, outside the Institution of Engineering and Technology. Also in London, the Michael Faraday Memorial, completed in 1961, is at the Elephant & Castle gyratory system. Faraday Gardens is a small park in Walworth, London, not far from his birthplace at

Newington Butts. A hall at Loughborough University was named after Faraday in 1960. Near the entrance to its dining hall is a bronze casting that depicts the symbol of an electrical transformer, and his portrait hangs inside. Buildings at the University of Edinburgh's science campus and Brunel University are named for him. The former UK Faraday Station in Antarctica was named after him. Streets named for Faraday can be found in many cities in the British Isles, France, Germany, Canada, and the United States. From 1991 until 2001, his picture was featured on the reverse of Series E £20 banknotes issued by the Bank of England. The SI unit of capacitance, the farad, is named after him, as is the Faraday constant, the charge on a mole of electrons (about 96,485 coulombs).

He became a Fellow of the Royal Society in 1824. In June 1832, he received a Doctor of Civil Law degree (honorary) from the University of Oxford. He rejected a knighthood and twice refused to become President of the Royal Society. In 1844, he was one of eight foreign members elected to the French Academy of Sciences in 1844.

When asked by the British government to advise on the production of chemical weapons for use in the Crimean War (1853-1856), he refused to participate citing ethical reasons.

He married Sarah Barnard (1800-1879) on 2 June 1821, and they never had any children. He died at his house in Hampton Court, England, on August 25, 1867. He had previously turned down burial in Westminster Abbey, but he has a memorial plaque there, near Isaac Newton's tomb. Faraday was interred in the dissenters' (non-Anglican) section of Highgate Cemetery because he was member of the Sandemanian sect of Christianity.

He was a chemist and physicist or *natural philosopher*, in the terminology of the time.

References

<http://scienceworld.wolfram.com/biography/Faraday.html>

http://en.wikipedia.org/wiki/Michael_Faraday