

U.S. Fire Administration / National Fire Academy

Coffee Break Training

Topic: The Chemical History of a Candle

Learning objective: The student shall be able to list three combustion principles that can be observed in a candle flame.

In our busy modern world, we sometimes forget the efforts of the hundreds of talented scientists and engineers who preceded us. These pioneering researchers established many of the foundations we employ today in fire protection technology.

From ancient times through today, men and women have studied fire and its effects. Once thought to be a basic element like earth, air, and water, we now know that fire is complex chemical interaction with dramatic physical effects.

In 1860, scientist Michael Faraday delivered a series of six lectures on “The Chemical History of a Candle.” These lectures were a seminal effort in the study of fire dynamics.

Among other things, Faraday observed that the candle flames drew fresh air in at the bottom and dispersed it through convective currents. He showed how the candle wick employed capillary action to transfer liquid fuel (predominantly animal fats) where it combined with oxygen into the flame. Faraday identified the importance of atmospheric oxygen to combustion. In addition, Faraday realized the important role carbon and other solids play in making flames visible.

While Faraday may not have had access to the sophisticated scientific measuring tools we have today, his powers of observation--and ability to communicate his findings--are as fresh today as they were 140 years ago.



Faraday was the son of a blacksmith, and was born near London, September 22, 1791. He became director of the Royal Institution of Great Britain laboratory in 1825, and professor of chemistry in 1833. He is most famous for his studies of electromagnetism, and today a unit of electrical capacitance is known as a “Farad” in his honor. Faraday died August 25, 1867.

In his final lecture on this topic, Faraday offered a quote that still shines brightly today: “There is another little point which I must mention before we draw to a close--a point which concerns the whole of beauty of the taper [candle]--by making your deeds honorable and effectual in the discharge of your duty to your fellow-men.”

For the complete text of Michael Faraday’s famous lectures, visit <http://www.fordham.edu/halsall/mod/1860Faraday-candle.html>