

Ozone is in the Atmosphere

During much of the 19th century the study of ozone received focus due to the discovery that ozone made an effective disinfectant. A lingering issue was whether or not ozone occurred naturally within the atmosphere. Schönbein had developed a paper strip that could be exposed and change color if ozone was detected. It was sort of like a litmus paper that we use to measure acidity (pH). The problem was that the measurement was not specific to ozone. The papers would also change color on exposure to hydrogen peroxide and perhaps to other substances. In the 1870s there were more than 300 locations around the world that were reporting measurements made by the Schönbein papers.

As we progressed into the later part of the 19th century, scientists began to develop instruments to measure the spectrum of the Sun's radiation. They could now, not only observe the spectrum qualitatively, but could measure the absolute amount at each wavelength. The measurement still was not easy. Photographic plates were used to determine the amount of radiation and they required carefully calibrating the photographic plates and the determine the amount of radiation by using a densitometer to determine the darkness of the plate at the position corresponding to each wavelength.



Marie Alfred Cornu

In 1879, Alfred Cornu of the École Polytechnique in France was measuring the spectrum of the Sun. He extended his measurements into the ultraviolet region of the spectrum, but when he got to wavelengths shorter than 300 nanometers the spectrum disappeared; went to zero. He called this the “cutoff” in the solar spectrum. He made measurements with the Sun overhead and with the Sun beginning to set and found that the position of the cutoff varied in a way that was consistent with something existing between his instrument and the Sun with that something absorbing the radiation.

Walter Hartley was a professor of chemistry at the Royal College for Science in Ireland. He used spectrometers similar to that of Cornu in his laboratory to measure the absorption of many molecules in the ultraviolet. In 1881 he had heard about the cutoff in the solar spectrum and suggested that the absorption was due to ozone, which he had been studying in his laboratory.



Above: Walter Hartley (1846-1913)

It is interesting that in the days when communication among scientists generally occurred through the exchange of letters, scientific communication reached across national borders and was an international enterprise. It was now demonstrated that ozone is part of the atmosphere.