Light of Very Short Wave-Length (2100 A.) in the Solar Spectrum

FABRY and Buisson[1] have shown that the short wave-length limit of the spectrum of the sun near 2900 A. is due to the absorption by ozone in the atmosphere of the earth. This absorption of the ultra-violet Hartley band of ozone begins at the wave-length 3100 A. and reaches a maximum at 2540 A. (Läuchli[2]). It is important to notice that the absorption falls rapidly on the short wave-length side of the band. Edgar Meyer[3] first pointed out that this property of ozone gives an opportunity of observing sunlight in the region of 2100 A. Several investigators searched for this short wave-length radiation, but without any success[4]. The reason for this is mainly given by the fact that below 2600 A., the atmospheric oxygen is strongly absorbing over long distances[5], so that it is necessary to use extremely sensitive apparatus to detect any radiation of this wave-length.

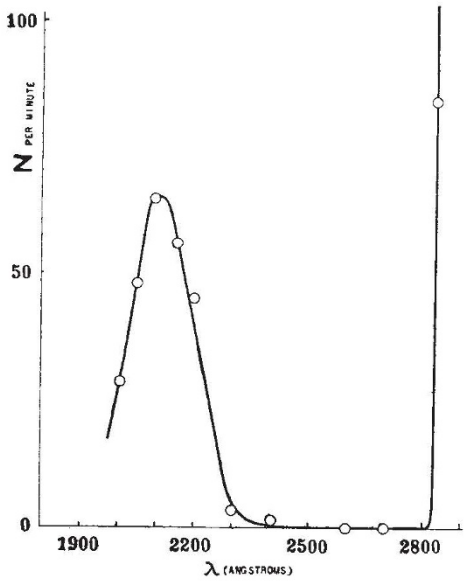

FIG. 1.

The researches of Schein and Stoll[6] show that it is possible to build extremely sensitive light counters for the ultra-violet, which enable very weak radiations to be measured. Such counters have been used to search for the above-mentioned radiation of the sun. On account of the absorption by oxygen in this spectral region the main experiments were carried out at great heights; at first in Arosa (1860 m.), afterwards at the Jungfraujoch (3460 m.).

A quartz monochromator was directed to the sun, and the radiation measured by a sensitive photon counter. The number of photons, which are proportional to the intensity of the radiation, were registered. A full description of the experiments will be given later in a more detailed paper.

The curve shown (Fig. 1) was obtained at the Jungfraujoch and shows the ultra-violet spectrum of the sun from 2000 A. to 2850 A. For these measurements a photon counter was used with a sensitive layer of platinum sputtered in an atmosphere of hydrogen. In the curve the number of registered photons is plotted against the wave-length in angstroms.

The curve obtained shows distinctly that in the short wave-length region of the ultra-violet a certain amount of sunlight reaches the earth's surface. The maximum intensity of this radiation lies at a point where the combined absorption of ozone and oxygen gives the greatest relative transparency of the atmosphere.

The following facts are characteristic of the intensity of this new radiation:

(1) It falls rapidly as the sun moves from the meridian to lower altitudes.

(2) It increases very much with the height above sea-level; at the Jungfraujoch we measured an intensity about a thousand times greater than at Arosa.

The more detailed discussion of these problems will shortly be published in a paper by M. Schein and B. Stoll in the *Helvetica Physica Acta*.

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Aug. 18.

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Steric Hindrance and Geometrical Isomerism

IT is not often that evidence in the form of steric hindrance is available for confirming the configurations of geometrical isomers among ethylenic compounds. The following observations are thus of interest. *cis*-αβ-Dibromocinnamic acid[1] (m.p. 100°) esterifies to the extent of only 6 per cent in one hour, and 33 per cent in 16 hours, by the Fischer-Speier method, whereas the *trans*-acid[1] (m.p. 136°) is esterified completely in one hour. This is in conformity with my earlier observation[2] in regard to the different modes of addition of bromine to β-phenylpropiolic acid and its methyl ester.

cis-*o*-Nitro-α-bromocinnamic acid (m.p. 159°) has recently been prepared for the first time, in these laboratories, by Mr. J. D. Vasavada and me, as dense yellow rhombic tablets, by crystallising from benzene the unesterified portion of the acid product of the direct nitration of *cis*-α-bromocinnamic acid[3] (m.p. 120°). It has also been made from *o*-nitrocinnamic acid dibromide by the action of alcoholic potash and pyridine. In ten per cent choroform solution with a trace of free bromine, it is transformed with remarkable ease, by a few minutes exposure to direct sunlight, into the insoluble needle-shaped crystals of the *trans*-isomer[4] (m.p. 212°), which is capable of complete esterification in 1 hour. This and further work in this series will shortly be published elsewhere.

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