



LXXIX. A modified form of double slit spectrophotometer

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LXXIX. *A Modified Form of Double Slit Spectrophotometer.*
 By A. L. NARAYAN, M.A.*

[Plate XIV.]

IN different kinds of spectrographic work which have been carried on in the Physical Laboratory of the College, the need for a good spectrophotometer in the visible and ultra-violet regions is keenly felt for the exact location of the absorption centres and for the measurement of their intensity. One of the spectrophotometers adapted to the purpose is the one designed by Vierordt. In this, the collimator is furnished with a double slit in front of which the absorption cell is placed in such a position that the dividing line between the two layers of different thicknesses or the dividing line between the liquid and air coincides with the junction of the two slits. And the slit widths are adjusted until equal illumination is obtained in both the spectra. But the difficulty in the way of regulating the brightness of the spectrum by altering the width of these slits is that it seriously interferes with the purity of the spectrum.

A modified form of double slit spectrophotometer has been devised, which is free from the defects of Vierordt's type. At the same time, it possesses many of the advantages of the sector photometer.

It consists essentially of an electromagnetically maintained pendulum the period of vibration of which is $\cdot 5$ second nearly, so that it executes 120 oscillations per minute. The bob of the pendulum is a heavy frame of brass containing two rectangular apertures one above the other, there being a well-defined line of demarcation between the two.

Two photographs are given, of which No. 1 shows the photometer and its parts, and No. 2 the photometer in position before the spectrograph.

The widths of both the slits can be adjusted by independent micrometer screws. The whole pendulum is mounted in front of the collimator slit of the spectrograph such that the line of separation between the two slits almost bisects the collimator slit. And the bob of the pendulum can be raised or lowered by a small amount by working a nut by means of which the whole frame constituting the bob is fixed to one end of the pendulum rod.

Since the period of the pendulum is $\cdot 5$ second, the whole

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length of the pendulum will not be more than 25 to 30 cm., so that the whole arrangement is very compact. Further, by the electromagnet arrangement, the oscillations will have a constant amplitude, and the amplitude also, if necessary, can be varied within certain limits.

It is also possible to produce very small diminution of intensity unlike the case of the sector photometer. It is free from the complications of a motor.

The slit-widths are adjusted so as to get equal illumination in both the spectra. If I' and I'' are the intensities of the incident and absorbed beams, we have

$$I'' = I' e^{-4\pi k \frac{d}{\lambda}},$$

where k is extinction coefficient, and d the thickness of the layer, so that

$$4\pi k \frac{d}{\lambda} \log e = \log (I'/I'') = \log (b'/b''),$$

where b' and b'' are slit-widths.

Therefore, by knowing b' and b'' , k the extinction coefficient can be determined.

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10th November, 1921.

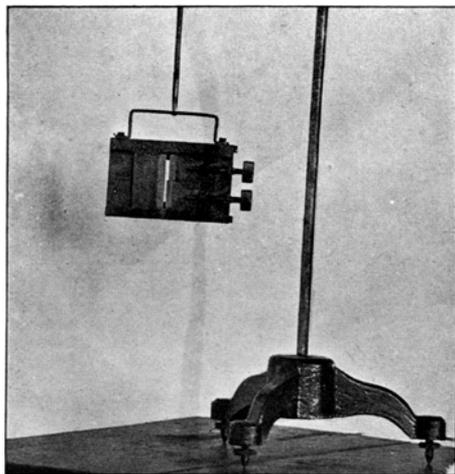
LXXX. *Surface Tension of Soap Solutions for Different Concentrations.* By A. L. NARAYAN, M.A., and G. SUBRAHMANYAM, B.A.*

[Plate XV.]

THE question of surface tension of soap solutions has from time to time attracted the attention of several scientists, of whom the late Lord Rayleigh was one, who in a series of investigations drew several conclusions of abiding interest. In his paper, "On the tension of recently formed liquid surfaces" (Proc. Roy. Soc. xlvii. pp. 281-287, 1890), Lord Rayleigh, following Marangani, attributed the capability of extension of a soap film into large and tolerably durable laminae to the "superficial viscosity" due to the presence upon the body of the liquid of a coating or pellicle composed

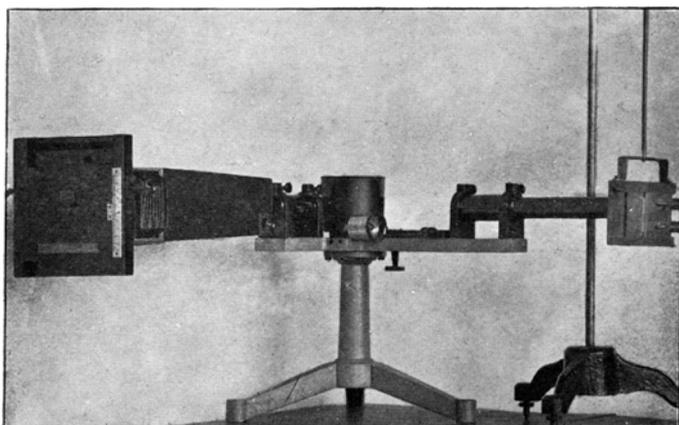
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FIG. 1.



Spectrophotometer.

FIG. 2.



Spectrophotometer in position.