

the sun. The intenser light of the relatively low inner corona will fall on a narrow strip of this lunar zone, bordering upon the edge of the surface upon which the photospheric light is falling.

Let the slit of a spectrograph be placed across the illuminated portion of the moon's surface so that half the slit is projecting over the apparently unilluminated lunar surface. It will thus cross this five mile zone, which will be reflecting corona light. The spectrogram should reveal first a strip of the usual reflected sunlight; then, theoretically, the emission lines of the high chromosphere; and then the typical corona spectrum.

The practical difficulties involved are the very long exposure times which would be required to gather sufficient reflected corona light to give the image, and the very exacting requirements of guiding.

If one of the powerful long-focus telescopes were used for this investigation, and a 15-inch image of the moon were formed at the plane of the slit, then a five-mile strip of the moon's surface would be 0.95 mm. at the slit. Hence the need for very accurate guiding is obvious, so that the edge of photospheric illumination will not encroach upon this critical millimetre of the slit.

Since earthshine is strongest upon the moon during its early phase, this would not be a good time, but at and near half moon would seem to be the most favourable period.

In Fig. 1, AM is the radius of the sun; MN indicates the region of the corona; B is the moon; PEM is tangent to both moon and sun, and QFN is tangent to moon and corona. Thus EG bounds the photospherically illuminated portion of the moon, while EG and HF define the zone illuminated only by coronal light. Obviously this narrow strip of the moon's surface presents the largest target as viewed from the earth at first and third quarter.

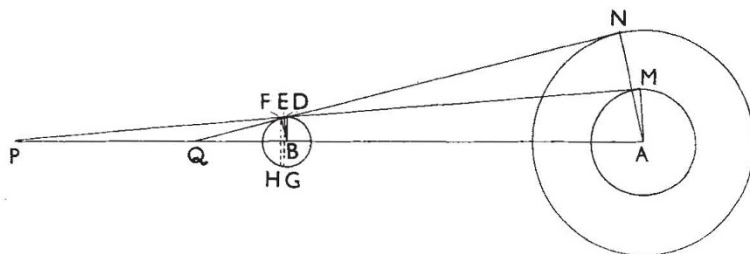


Fig. 1.

The director of Mount Wilson Observatory has expressed his interest in this proposed method of investigating the corona, and suggests the desirability of having the method tried out at more than one observatory.

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Viscosity of Binary Mixtures

THE equation¹

$$\log \eta = N_1 \log \eta_1 + N_2 \log \eta_2 \quad (1)$$

which is advanced by Dr. Lederer to give η , the viscosity of an ideal binary mixture, assumes that N_1 and N_2 are the physical molecular weights of the liquids 1 and 2 the viscosities of which are respectively η_1 and η_2 .

Now, if S_1 and S_2 are the association factors for the respective liquids, then the relation between m_1 and m_2 , the chemical molecular fractions of the liquids, and N_1 and N_2 is:

$$N_1 = \frac{m_1/S_1}{m_1/S_1 + m_2/S_2} = \frac{m_1 S_2}{m_1 S_2 + m_2 S_1} \quad (2)$$

$$= \frac{m_1}{m_1 + m_2 S_1/S_2}$$

If $S = S_1/S_2$, then

$$N_1 = \frac{m_1}{m_1 + m_2 S} \text{ and } N_2 = \frac{m_2 S}{m_1 + m_2 S} \quad (3)$$

S in equation (3) is, therefore, the ratio of the association factors of the liquids 1 and 2, respectively.

In Dr. Lederer's communication¹ the factor S is defined as the degree of association of component 2, but it would appear more correct to define S as the ratio of the association factors as derived in (3) above.

A further matter of interest is that the value of S varies (for the system benzyl benzoate in toluol at 25° C.—Kendall and Munroe's data) by 4 per cent about the mean value, as shown in the accompanying table.

m_1	$S = S_1/S_2$	
0.2367	0.805	
0.4261	0.818	
0.6502	0.840	Mean value 0.836
0.7890	0.862	
0.9002	0.860	

m_1 is the chemical molecular fraction of benzyl benzoate in toluol taken from Kendall and Munroe's data. Kendall and Munroe, however, showed that the freezing point data of solutions of benzyl benzoate in toluol were normal, whence $S_1 = \text{unity}$; hence the average value of $S_2 = 1.197$, that is, the average degree of association of toluol is 1.197 in this solution.

Dr. Lederer referred the value 1.197 to benzyl benzoate as an association factor, and in so doing appears to be in error.

It may be observed that an excellent test for the veracity of equation (1) above would be provided by an ideal binary mixture of components of approximately equal viscosity characteristic, because it is clear from relation (1) that if $\eta_1 = \eta_2$, then $\eta = \eta_1 = \eta_2$. Such a mixture should, of course, show no heat effects on mixing and have the

general characteristics which guided Kendall and Munroe in accepting benzyl benzoate in toluol as an ideal mixture. An approximate test obtains with the system propyl acetate + benzol—a system showing but a small heat effect on mixing—and, in this case, the value η is less than η_1 or η_2 , whence equation (1) cannot apply. Dr. Lederer's fundamental equation

$$\log \eta = m_1 \log \eta_1 + m_2 \log \eta_2 - \int \frac{qm}{4.577T^2}, \quad (4)$$

however, provides for such cases where the integral involving the molecular heat of solution qm must be evaluated.

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¹ NATURE, 139, 27 (1937).