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COMMUNICATIONS TO THE EDITOR

COMPARISON OF X-RAY PHOTOGRAPHS TAKEN WITH X AND Y BUILT-UP FILMS

Sir:

Some time ago Mr. Clifford Holley and I reported [*Phys. Rev.*, **52,** 525 (1937)] that X films of calcium stearate have approximately the same grating-space as Y films of barium–copper stearate. In Figs. 1 and 2 are shown some of the photographs taken with films built by Dr. Katharine Blodgett on the basis of which this statement was made. They show Lα and Lβ lines of tungsten in the first three observable orders on both sides of the direct beam. Figure 1 was taken with an 1100 layer Y film of barium–copper stearate, Fig. 2 with a 300 layer X film of calcium stearate. In both cases the direction of dipping was parallel to the axis of rotation of the film. It can be seen that the photograph taken with the X film is essentially the same as the one taken with the Y film with respect to both the grating-space and the relative intensities of the various orders. The grating-spaces of these films, corrected for refraction and based upon the ruled grating wave length scale, are: Y film of barium–copper stearate, 50.47 Å.; X film of calcium stearate, 50.12 Å.

Porter and Wyman have shown [THIS JOURNAL, **59,** 2746 (1937)] that the contact potentials of X films increase with the number of layers, whereas those for Y films remain constant. The X-ray photographs, however, seem to be independent of the contact potential. The potentials of an X and a Y film of calcium stearate were measured, after which photographs of the kind shown here were taken. The photographs were much the same as those shown, despite the difference in the contact potentials of the films before exposure. The apparent grating-spaces of the two films in the first order differed by about 1%, the X film having the greater spacing. The two films were built from 10^{-4} molar solutions of calcium chloride. Castor oil was used as piston oil for the X film, and oleic acid for the Y film.

Fig. 1.—Three orders of tungsten L-spectra from Y film.

Fig. 2.—Three orders of tungsten L-spectra from X film.

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PRESSURE–AREA RELATIONS OF MONOLAYERS AT THE SOLID–LIQUID INTERFACE

Sir:

While the pressure $F = \gamma - \gamma'$ of a monolayer on water may be determined by a film balance, no method has been known for obtaining F at a solid–liquid interface. In order to determine this value the contact angle θ_1 between the plane surface of the solid and the pure liquid is found by an improved form of the tilting plate method, so arranged that the surface of the liquid can be kept clean by sweeping. Then the pure liquid of surface tension γ_l, *e. g.*, water, is replaced by a solution of the desired solute, of tension $\gamma_{l'}$ and the new contact angle θ_2 is determined. Then

$$\gamma_s = \gamma_{sl} - \gamma_l \cos \theta_1 \qquad (1)$$
$$\gamma_s' = \gamma_{sl}' - \gamma_{l'} \cos \theta_2 \qquad (2)$$

where s indicates a solid.