The radiation (1) is absorbed by glass and fluorite; (2) penetrates aluminium foil 0·0006 mm. thick; (3) has an intensity (as measured by the action on the film) which is determined by the current in the tube at constant potential. (1) excludes the region from about 8000 A. to 1200 A. of the spectrum; (2) excludes the Millikan-Lyman region; and (3) is consistent with the hypothesis that the radiation is X-radiation which is emitted according to the usual laws. With 375 volts potential difference and a carbon target the radiation will consist mainly of the K line of carbon of 45 A.

The results obtained do not appear to be reconcilable with the Lorentz dispersion formula.

If these preliminary observations have been correctly interpreted, X-rays can be reflected from spherical surfaces and brought to a focus. This makes possible new methods for the study of long X-rays.

T. H. LABY.
J. SHEARER.
R. BINGHAM.

University, Melbourne,
June 26.

A Cartesian Diver Experiment.

MOST of us are familiar with the lecture-table experiment known as the Cartesian Diver. A variation of this is shown in Fig. 1*a*. In this apparatus the diver is replaced by a test-tube T floating upside down in the water, being buoyed up by just the right quantity of air, A. The tall jar is nearly filled with water, and then capped by a rubber membrane tied on tightly. When the membrane is pressed in, the pressure of the air just below it is communicated through the water to the air, A, within the test-tube (thus illustrating Pascal's principle). This lessens the volume of the air, and thus its buoyant force (thus illustrating Archimedes' principle), and consequently the test-tube sinks. The tube may therefore be caused to float or sink or remain stationary in the water by suitable pressure on the rubber membrane.

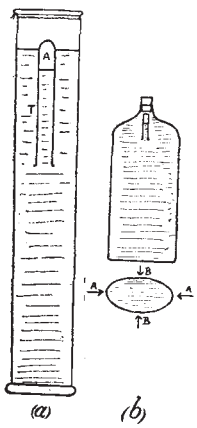

FIG. 1.

In the further modification which I am about to describe, the rubber membrane is replaced by an india-rubber stopper, but the change of pressure may be produced in another way. A bottle (Fig. 1 *b*), about 9 in. high, of oval cross-section (such as is sold with patent medicines), is filled with water. In it is placed, upside down, a little glass tube (a small phial or specimen tube), just buoyed up with the right amount of air so that it floats.

A rubber stopper is inserted in the neck of the bottle, either eliminating all the air or leaving in just a bubble. A slight adjustment of the stopper makes the little tube either sink or rise, as before. The interesting point now is that if when the tube is floating, the bottle is grasped in the hands and squeezed hard in the directions B B, the tube sinks. Also that if when the tube is at the bottom, the bottle is squeezed hard in the directions A A, the tube rises.

The phenomenon thus illustrates the change of volume brought about by deforming the cross-section of the bottle. Squeezing at A A makes the cross-section more circular, thus increasing the area; squeezing at B B makes the cross-section more elliptical, thus decreasing the area.

The bottle experiment was brought to my notice by one of my students, Mr. A. E. Allin, and it deserves a wider acquaintance. JOHN SATTERLY.

University of Toronto.

The Spectrum of Ionised Sodium.

WITH reference to the interesting and important note by O. Laporte in NATURE of June 16, p. 941, the pairs of differences in the wave numbers which I found in the Na II spectrum do not appear to be accidental. For example, using Laporte's notation:

$$p_5 - p_4 = 218$$
$$p_6 - p_5 = 697$$
$$p_8 - p_4 = 2467$$
$$p_{10} - p_2 = 7285$$

and it is probable that the other pairs of differences will be found as differences between the values of the s', d, and d' terms, which, from the preliminary analysis of Laporte, appear to resemble in number those found by Paschen in the analysis of the Ne I spectrum. Mazumdar (*Indian Journal of Physics*, p. 345; 1928) has noted, previously, that the frequency differences between the four lower levels $^3P_2$ $^3P_1$ $^3P_0$ $^1P_1$ are respectively, 765, 592, and 2481 cm.$^{-1}$, and he has arranged the multiplets from the combinations $6L_2 \leftarrow\!\!- 5L_2M_1 \leftarrow\!\!- 5L_2M_2$ and $5L_2(M_2 \leftarrow\!\!- M_3)$, but in his classification S P D terms correspond to the p terms of Laporte.

It is to be expected that the Na II spectrum will yield on analysis series similar to those found by Paschen for Ne I, but more experimental work in the Schumann region is required before any such analysis can be completed. F. H. NEWMAN.

University College of the
South-West of England,
Exeter, June 23.

Monomolecular Films.

WE have read with great interest the letter of Messrs. Sheppard and Keenan in NATURE of June 23 (p. 982). Some recent experiments we have made with monomolecular films of the elastic jelly of vulcanised triolein lend support to the second of their two suggestions to account for the very low values for the film thickness of cellulose esters spread on mercury. They suggest that the low value of the thickness represents the thickness of a polymeric chain or sheet.

We have examined vulcanised triolein, and a series of polymerised products of increasing molecular weight obtained from it (P. Stamberger, *Rec. Trav. Chim. Pays-Bas*, **46**, 837; 1927). Increasing degree of polymerisation is paralleled by change from a viscous liquid to an elastic solid. We have measured the thickness of films on water of products containing one, two, and at least seven molecules of vulcanised triolein. The latter product is a fairly elastic solid. The thickness of the films of all these products is practically the same, namely, about 14-16 A. at 16° C. The value for triolein is 13·0 A. From these measurements, and measurements on the vulcanised fatty acids obtained by saponification, we conclude that in the polymerised products the molecules are joined side by side in a definitely oriented manner in long chains, leaving the polar groups unaltered. Full details of this work are shortly to be published. B. C. J. G. KNIGHT.
P. STAMBERGER.

Chemistry Department,
University College, London,
June 27.

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