It is more difficult to draw a definite conclusion as to the ranges of the particles constituting a pair, owing both to the finite thickness of the target (3·5 mm. of air) and to the possibility that such a powder target may be far from uniform. Measurement of the sum of the ranges of the tracks produced in the chamber plus the equivalent path in the target (assumed uniform), reduced to air at N.T.P., gave the

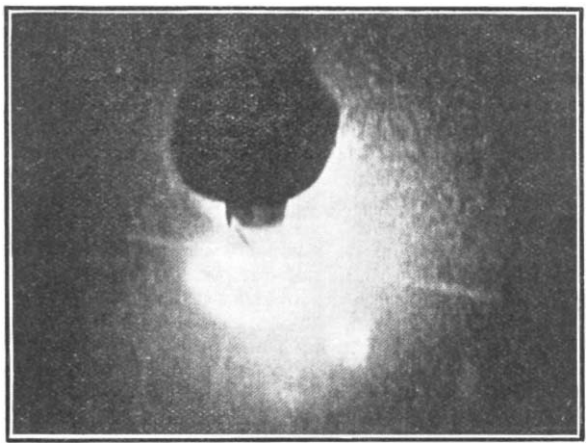

FIG. 1.

values 21·0, 20·4, 22·2, 22·0, 20·0, 26·6, 28·7 mm. (The latter two values were subject to greater experimental error than the former.)

To settle whether the reaction in question is

$$^{7}_{3}\mathrm{Li} + ^{1}_{1}\mathrm{H} \rightarrow ^{4}_{2}\mathrm{He} + ^{4}_{2}\mathrm{He} + \gamma \text{ radiation}$$

or $$^{7}_{3}\mathrm{Li} + ^{1}_{1}\mathrm{H} \rightarrow ^{5}_{2}\mathrm{He} + ^{3}_{2}\mathrm{He},$$

or some reaction in which neutrons are emitted, will require further work, using a thinner and more uniform target and a corresponding increase in proton intensity. It is, however, interesting to note that although in six pairs the angle between the tracks was greater than 175°, in one case this angle was 156°. The minimum angle which might be expected to conserve energy and momentum in the former reaction is 162° for the particular proton accelerating voltage used.

Note added to proof. Kirchner claims that the short-range group from lithium consists of a continuous distribution of ranges from 5 to 15 mm. (*Phys. Z.*, November 1933). Although in the experiments described above the ranges *in the gas* varied from 4·4 to 11·8 mm., no conclusion may be drawn as to the actual ranges of the particles emitted in the disintegration, as the observed range distribution could as well be explained by assuming a homogeneous group and correcting in each case for the possible path in the target. Kirchner makes no statement about his target thickness.

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[1] NATURE, 131, 23, Jan. 7, 1933.
[2] *Proc. Roy Soc.*, A, 141, 722; 1933.
[3] *Proc. Roy. Soc.*, A, 141, 733; 1933.
[4] *Naturwiss.*, Nr. 21, 676; 1933.

A Catalysed Reaction of Hydrogen with Water

IT has been recently observed by M. L. Oliphant that, when hydrogen is kept in contact with water for a few months, an exchange of atoms occurs between the hydrogen and the water[1]. We have now found that this reaction can be catalysed by platinum black, such as is used in hydrogenation.

In a quartz vessel (of 100 c.c. capacity) 8 c.c. of a 1·1 normal solution of sulphuric acid in water was introduced, together with 170 mm. of hydrogen containing 1·08 per cent of deuteronium (heavy isotope of hydrogen). A quantity of platinum black (0·47 gm.) produced by reduction of platinum chloride with formaldehyde was added and the mixture was shaken at room temperature for an hour. After this time, the hydrogen was completely removed from the vessel and its deuteronium content determined. It was found to have fallen off to 0·66 per cent. When hydrogen was similarly treated without addition of platinum black, no perceptible change occurred.

We suggest that the catalytic exchange of atoms between hydrogen and water caused by platinum black is due to the ionisation of hydrogen corresponding to the electromotive process of the hydrogen electrode. When a hydrogen electrode is in equilibrium with an aqueous solution, it constantly produces ions from the hydrogen, while an equal amount of hydrogen is formed from the ions of the solution. If the hydrogen contains deuteronium, this process leads to the replacement of deuteronium by hydrogen.

It seems that the slow atomic exchange between hydrogen and water previously observed may be due to some hidden catalyst acting in a similar way to that described here. It is possible that the walls of the vessel act as a weak ionising agent, since it is known that glass can form a hydrogen electrode.

We have to thank Prof. H. S. Taylor, of Princeton, for the deuteronium water used in these experiments. We produced our hydrogen by decomposing water with iron at about 500°. When an excess of water containing 1·8 per cent of deuteronium was used in large excess to iron, the hydrogen formed contained 1·1 per cent deuteronium. This shows that deuteronium water reacts with iron at a slower rate than ordinary water.

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[1] NATURE, 132, 765, Oct. 28, 1933.

Formaldehyde in the Upper Atmosphere

IN a recent communication[1] Götz, Dobson and Meetham have reported that the average height of ozone in the atmosphere at Arosa, Switzerland, is about 20 km. This height is much less than the former estimates. Götz and Ladenburg[2] and Buisson[3] are in agreement with this view. Even at a height of 2–3 km. a perceptible amount of ozone may be present, but the highest concentration seems to be at a height of 15–50 km.

R. Mecke[4] has stated that the amount of ozone found in the lower layers of the atmosphere may be partly due to some ozone molecules dropping down due to gravity from the higher parts of the atmosphere and thus surviving their decomposition by ultra-violet light. According to R. Mecke, the probable mechanism for the formation of ozone from oxygen is as follows:

$$O_2 + O_2'' (<\lambda 2025) = O_3 + O'$$

Warburg[5], however, obtained ozone from oxygen even in radiations of wave-length 2530 A., although the beginning of molecular absorption of oxygen is assumed to be at 2020 A. According to Fabry and