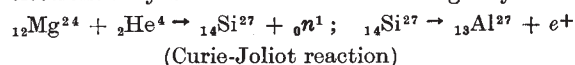
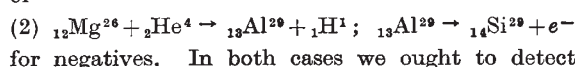
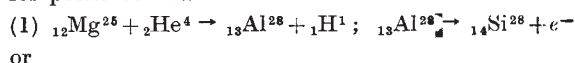


In order to ascertain the true origin of the negative electrons, the following experiments were performed. A sheet of tinfoil or paper was exposed to α -rays under the same conditions as the magnesium. The absence of radioactive impurities was proved by the absence of β -particles in these two cases. The β -particles were also absent when the source was covered by a tinfoil in order to stop the α -particles. Thus it is evident that the phenomenon is due to the bombardment of α -particles.

The number of negative electrons quickly diminishes with time (the half-period is about 3 min.). The limit of the continuous spectrum of the negative electrons is above 2×10^6 e.v. The probable nuclear reactions in the case of positive and negative electrons may be written in the following way:



for positives and



for negatives. In both cases we ought to detect radioactive atoms of aluminium.

In the case of aluminium we were also able to obtain the emission of negative electrons, but their number is considerably less than the number of positive electrons.

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May 13.

¹ Alichanow, *NATURE*, **133**, 581, April 14, 1934.

Absorption of Hydrogen by Nickel

In order to measure the adsorption of hydrogen by pure nickel, free from oxygen, I used a silica tube, containing 12 kilometres of a very thin nickel wire (total weight of the wire 42 grams, mean diameter 0.022 mm.), giving an available surface of at least 8,400 cm.². The preliminary results indicate that between 200° and 650° C., and pressures up to 0.2 mm. Hg, there is no measurable adsorption of hydrogen, but an appreciable adsorption (homogeneous solution). The results are in good agreement with Sieverts' measurements with much thicker nickel wire at higher pressures and temperatures¹. The amount of absorbed hydrogen at a constant temperature is, within the experimental error, proportional to the square root of the pressure, and increases at constant pressure with increasing temperature, obeying the simple equation: $\log a = A - B/T$. The heat of absorption, calculated from this isobare, is a little less than -3 k.cal. per gram mol hydrogen.

Further details, together with the results at lower temperatures, which are under investigation, will be published shortly.

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The University,
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April 17.

¹ A. Sieverts, *Z. physik. Chem.*, **60**, 129; 1907. A. Sieverts and J. Hagenacker, *Ber.*, **42**, 338; 1909. A. Sieverts, *Z. physik. Chem.*, **77**, 591; 1911.

Production of Large Quantities of Heavy Water

FROM the discussion recently held in the Royal Society¹, and from several communications on heavy hydrogen published in *NATURE*, it is obvious that larger quantities of heavy water are at present much needed for investigations in several branches of physics, chemistry and biology. To meet this demand, Imperial Chemical Industries, Ltd., is to undertake commercial production at Billingham². It may also be of interest to report in this connexion, that various concentrates of the new water are now produced on a large scale in Norway by Norsk Hydro-Elektrisk Kvælstofaktieselskab, Oslo. Large quantities of '1:300-water' can be obtained from the above company, and richer concentrates will be available at a later date.

This company at its works in Rjukan has one of the largest electrolytic hydrogen plants of the world, with a capacity of about 20,000 m.³ per hour. Assuming the efficiency of separation by electrolysis so low as 10 per cent³, a quantity of about 10 litres of 'pure' heavy water a day can be produced if the consumption requires.

In full agreement with other investigators, it has been found that the efficiency is only slightly affected by the conditions of the electrolysis⁴. However, certain difficulties arose using sulphuric acid with lead electrodes, due to the formation of porous lead on the cathodes and to the formation of fog. The efficiency of separation in both acid and alkaline solution agree fairly well with that found, for example, by Harteck⁵. Further details of the experimental results are to be published shortly in the *Zeitschrift für Elektrochemie*.

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¹ *Proc. Roy. Soc., A*, **144**, 1; 1934.

² *NATURE*, **133**, 604, April 21, 1934.

³ Taylor, Eyring and Frost, *J. Chem. Phys.*, **1**, 823; 1933.

⁴ Compare, for example, Topley and Eyring, *NATURE*, **133**, 292, Feb. 24, 1934. Bell and Wolfenden, *ibid.*, p. 25.

⁵ Harteck, *Proc. Roy. Soc.*, loc. cit. and *Proc. Phys. Soc.*, **40**, 277; 1934.

Galvanometer Amplification by Photo-Cell

I NOTE with interest Prof. A. V. Hill's letter in *NATURE* of May 5, describing the use of a Weston 'photronic' cell in a differential galvanometer relay. It is somewhat surprising that Prof. Hill's apparatus gives such a small amplification. A Weston cell which has been used in a photo relay in this Laboratory for the last three months has given consistently a current amplification of 200. As we are using the same type of galvanometer as Prof. Hill, it would seem that the only reason which can explain his having not obtained more than a twenty-fold amplification must be the difference in the optical system.

Full details will be found in a Laboratory Note communicated to the *Journal of Scientific Instruments* early in March.

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May 5.