

Abnormally High Magnetic Permeability of Nickel Wire obtained by Surface Treatment

A LENGTH of 0.125 in. diameter pure nickel wire was heated to a temperature of 1,150° C. in a steady stream of hydrogen gas by means of an electric resistance furnace, and the maximum value of the permeability was measured periodically when cold. The results so obtained are plotted as Curve I in Fig. 1. It will be seen that the maximum permeability attains a value of 2,100 after about 7 hours. The greatest value for the permeability of nickel previously recorded¹ is 1,400.

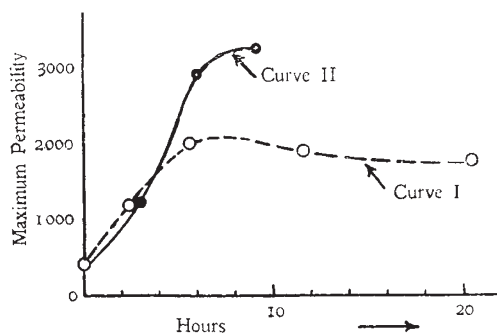


Fig. 1.

A length of nickel wire from the same coil was then electro-plated with copper to a thickness of about 0.003 in. and heated to a temperature of 1,030° C. in a steady stream of hydrogen, and the value of the maximum permeability was again measured at intervals when cold. The results are given in Curve II, Fig. 1. It will be seen that the maximum permeability now reaches the value 3,250. The value of the coercive force when the wire was demagnetized from an induction density of 5,150 gauss was found to be 0.24 oersted and the remanent induction density was 1,270 gauss.

The investigations are being extended to examine the effects of thin coatings of other metals such as aluminium, iron, cobalt.

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See *The Engineer*, April 2, 1937.

Rotational Analysis of the '3A' Bands of CO

THE so-called '3A' bands of CO in the region 2200–2600 Å. have been excited with high intensity in a discharge through neon in a Geissler tube with carbon electrodes, and the (0,1), (0,2) and (0,3) bands at 2389, 2489 and 2596 Å. have been photographed in the first order of a large 'Hochheimized' concave grating (dispersion 1.3 Å./mm.). By fine-structure analysis twelve branches have been detected in each band, the others being weak and overlapped. Of these twelve branches, six form heads, namely, O_3 , O_2 , P_3 , P_2 , P_1 , Q_1 in order of diminishing wavelengths, and six do not form heads, namely, R_3 , R_2 , R_1 , Q_3 , Q_2 , S_1 . This shows the upper state to be a $^3\Sigma$ state, the rotational constant of which is found to be 1.9563 cm.⁻¹ from the average of three times six double combinations for the upper state.

The lines of the (0,1) '3A' band extend to the red-degraded (9,18) Fourth Positive band, the upper state for which predissociates¹ at 9.57 V. above the ground state of CO. The rotational analysis of the '3A' bands shows that the apparent increases of intensity of some of the Fourth Positive band lines (shown in plate I of the paper cited) behind the point of predissociation are caused by the superposition of certain '3A' band lines.

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¹ Gerö, L., *Z. Phys.*, **100**, 374 (1936).

Structure of BrSiCl₃ studied by means of Electron Diffraction

USING a de Laszlo apparatus similar to that used for the study of HSiCl₃¹ and HSiBr₃², we have been able to measure the distances between the atoms of BrSiCl₃. These appear to be: Br-Cl = 3.41 ± 0.03 Å.; Cl-Cl = 3.39 ± 0.01 Å.; Si-Cl = 2.05 ± 0.05 Å.; Br-Si = 2.19 ± 0.05 Å.

In our work on HSiBr₃², we mentioned that the accuracy of the distance measurements of atoms in a molecule of this kind is very different for the different atoms involved. The distances between the halogens may be considered as measured with considerable accuracy, but on the other hand the distance between the halogens and the silicon atom is not so accurate. This is due to the fact that small variations of the Cl-Cl or Br-Cl distances affect greatly the positions of the different maxima of the curve giving relative intensity as a function of half diffraction angle; variations of Si-Cl and Si-Br distances have very little effect on this angle.

At the end of our earlier letter, "Geometrical Constitution of Silicichloroform", we gave the following dimensions for angle and height of the pyramid SiCl₃: height, 0.65 Å.; angle, 113° 30'. These should read: height, 0.62 ± 0.20 Å.; angle, 111° ± 4°; as can be calculated from the distances Si-Cl and Cl-Cl given in that letter.

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¹ de Hemptinne, M., and Wouters, J., *NATURE*, **138**, 884 (1936).
² Wouters, J., de Hemptinne, M., and Capron, P., *Ann. Soc. Scientif. Brux.*, **57** (1937).

Fire-Walking

I SHALL be glad to be permitted to supplement the report in *NATURE* of April 17 on the fire-walking experiments which I organized for the University of London Council for Psychical Investigation. The article records the results of two tests (at Carshalton, on April 7 and 9), but does not mention the third—and final—demonstration with the Indian professional.

This was staged in the grounds of Alexandra Palace on April 20. The trench was 12 ft. long, 4 ft. wide, and 9 in. deep. Some four tons of oak