Transition Curve for the Destruction of Supraconductivity by an Electric Current

In former experiments with a tin ring¹ we found that, when supraconductivity is destroyed by an

FIG. 1.

electric current, the field-strength H_{kj} corresponding to the critical current is equal to the critical magnetic

field-strength H_k . In order to measure H_{kj} we have now employed the exceedingly high thermal conductivity of He II. Through a tin wire of radius 0.0056 cm. immersed in He II, we were able to send an enormous current (1.5×10^5 amp./sq. cm.) without noticeably heating the wire or the helium, which enabled us to determine the entire transition curve.

The relation between R and I —the second scale is for $H_{kj} = 0.2 I/r$ —is depicted in Fig. 1. The resistance unit is taken as $R_{3.8^\circ K}$, that is, the resistance at $3.8^\circ K$.

Results: (1) We found that the sharp jump in the resistance corresponds to $H_{kj} = 219$ gauss, which within the limits of experimental error—a few per cent—coincides with the field-strength formerly observed², which was 218 gauss.

(2) The resistance rises steeply only up to $0.8 R_{3.8^\circ K}$. Afterwards it rises gradually to the normal value for the non-supraconducting metal.

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Oct. 6.

¹ L. Shubnikov, *NATURE*, **133**, 545 (Sept. 26, 1936). L. W. Shubnikov and W. J. Chotkewitsch, *Sov. Phys.*, in the press.

² Shubnikov, Chotkewitsch, Schepelew and Rjabinin, "Arbeiten auf dem Gebiete tiefer Temperaturen", *Sov. Phys.*, Sondernummer, June 1936, p. 48.

Points from Foregoing Letters

CURVES showing the effect of 'Citrin'—the crystalline flavone fraction of lemon juice—in prolonging the life of guinea pigs fed on a scurvy diet are submitted by A. Bentsáth, St. Ruzsnyák and Prof. A. Szent-Györgyi. The active principle (vitamin 'P') appears to have a marked influence upon the capillary system.

A method of estimating ascorbic acid (vitamin C), depending upon the addition of excess of methylene blue and titrating the excess with titanium trichloride, is described by Dr. Imre Gál. On the same subject, H. Cheftel and M.-L. Pigeaud state that by cooling the ascorbic acid solution to $0^\circ C$. it is possible to slow down its rate of oxidation and to obtain more consistent results by the method of Harris and Ray (titration with 2 : 6 dichlorophenol indophenol in acid solution).

By means of diet experiments on mice, Drs. A. and M. Lasnitzki have investigated the question whether 'mineral' and 'biological' potassium are equivalent, in view of the possibility that the isotopic constitution may be different. Body-weight and duration of life are affected, but the results are complex.

From the change in the diffusion constant and the rate of sedimentation in the supercentrifuge, it has been deduced that horse hæmoglobin in concentrated solutions of urea, acetamide and formamide, is partly dissociated into particles of half the original weight. Dr. J. Steinhardt puts forward further support for this view and finds that there is no denaturation in the process. He has investigated the properties of methæmoglobin and hæmochromogen prepared from the dissociated hæmoglobin, and he discusses their

bearing on current theories of the equilibrium between hæmoglobin and oxygen.

Small quantities of air-blown cacao-butter added to olive oil have the specific property of preventing cloudiness and deposition of stearin on storage at $2^\circ C$., according to Dr. W. Clayton, S. Back, R. I. Johnson and J. F. Morse.

A difference in the diamagnetic susceptibility of living and dead bacteria is reported by Prof. E. Bauer and A. Raskin. This, they claim, supports Bauer's theory that the lack of equilibrium in living systems is due to an 'excited' state of the protein molecules of the protoplasm.

Two cases of loss of nitrate (due probably to formation of free nitrogen), one in a culture of the unicellular freshwater alga, *Chlorella*, and another in the presence of daffodil leaves, are reported by Dr. W. H. Pearsall and M. C. Billimoria.

Dr. A. Clow and J. M. C. Thompson find that the diamagnetic susceptibility of carbon dioxide agrees with that calculated from the 'resonance' energy according to the formula of Pauling and Sherman. In the case of other compounds, differences occur between the calculated and the experimental values, and the authors suggest certain possible interpretations.

Using an improved device for obtaining Raman spectrograms with crystal powders, R. Anantha-krishnan has obtained evidence indicating that the constitution of phosphorous acid should be represented by