dry. A mount can be made in a nutritive solution and with this method the concentration will not be changed. The tube and beaker of water can be sterilized so that the mount will keep in good condition for several days though the length of time will depend on whether it has been made from pure culture or fresh material. If the tube is properly elevated there will be no water current so that this method is also favorable for photomicrographic work.

FLORENCE A. MCCORMICK
CONNECTICUT AGRICULTURAL
EXPERIMENT STATION

SPECIAL ARTICLES

SOME PECULIARITIES IN THE THERMOELECTRIC PROPERTIES OF MONEL METAL

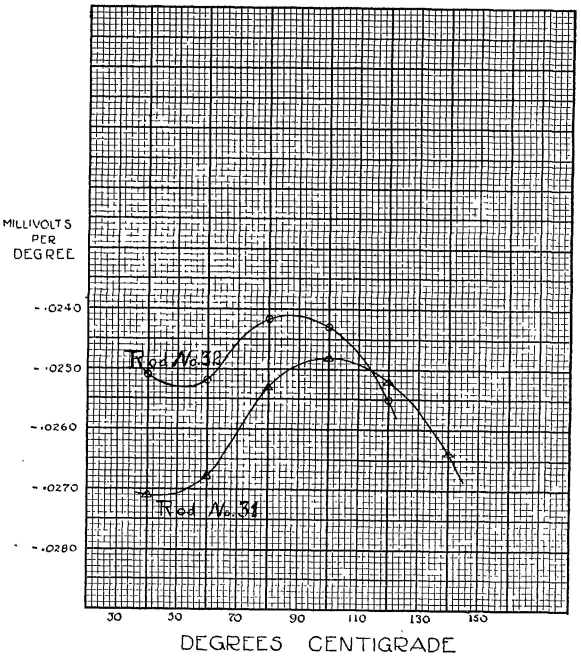
IT has been shown by Tait[1] and by Belloc[2] that there is a very close relationship between the magnetic and the thermoelectric properties of certain ferromagnetic substances. For iron and nickel there is a maximum in the $\frac{dE}{dT} - T$ curve at the same temperature as that at which the substance loses a large part of its ferromagnetic properties. Sometimes this maximum serves to locate the critical temperature with greater accuracy than is possible from measurements on permeability or magnetostriction.

The specimens studied in the present investigation were two rods of monel metal about 60 cm long. The one designated as Rod No. 31 was approximately 0.65 cm in diameter, while Rod No. 32 was approximately 0.48 cm in diameter. The permeability and magnetostriction in both these rods had been investigated by others[3] and the thermoelectric method was tried in the hope that it might afford a more accurate determination of the critical point.

Each rod was joined at one end to a suitable length of lead wire to form a lead-monel metal thermocouple. The couple under test, together with a chromel-alumel couple, was mounted so that the "hot junctions" could be heated in an electrically heated oil bath while the "cold junctions" were maintained at 0° C. in a suitable ice bath. The leads from the cold junctions were connected to a potentiometer through a double-pole, double-throw switch so that readings of the e. m. f. for the two couples could be taken alternately at short intervals. The temperature of the oil bath was raised at the rate of about 2 to 2.5° C. per minute and the e. m. f. of each thermocouple was read every minute. With this rate of heating, the temperature can be considered as a linear function of the time for short periods and, hence, the temperature of the lead-monel metal couple at the time that its e. m. f. was observed was obtained by interpolation from the readings on the chromel-alumel couple.

In the following table the average values $\frac{dE}{dT}$ are given as computed from these data for intervals of $dT = 20°$ C. The use of smaller intervals for dT, although desirable, did not seem to be warranted by the accuracy of the data and method.

Interval	Mean temperature, T° C.	$\frac{dE}{dT}$ in millivolts per degree	
		Rod No. 31	Rod No. 32
30– 50°	40°	– 0.0271	– 0.0251
50– 70°	60°	– 0.0267	– 0.0252
70– 90°	80°	– 0.0253	– 0.0242
90–110°	100°	– 0.0248	– 0.0243
110–130°	120°	– 0.0252	– 0.0255
130–150°	140°	– 0.0264	



When these results are plotted, as in the accompanying figure, the maxima are quite definite, at 100° C. for Rod No. 31 and at 87° C. for Rod No. 32. The number of observations made does not justify claiming an accuracy of better than 2 or 3 degrees

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[1] P. G. Tait, *Proc. Roy. Soc. Edin.* 7, 597, 1871.

[2] G. Belloc, *Ann. de chim. et de phys.* 30, 42, 1903.

[3] D. R. Inglis, *Instruments,* 2, 129–132, 1929.

for these points, so that the results are to be regarded as qualitative rather than quantitative. It should be noted that Rod No. 31 exhibits a greater change than Rod No. 32. This is in agreement with previous observations[4] on the permeability and magnetostriction of these rods which showed that Rod No. 31 is more ferromagnetic than Rod No. 32.

The author is very much indebted to Professor S. R. Williams for suggesting the problem and to Professor W. W. Stifler for valuable advice and assistance in carrying out the experimental work and in preparing the results for publication.

EMERY MESCHTER
FAYERWEATHER LABORATORY OF PHYSICS,
AMHERST COLLEGE,
AMHERST, MASSACHUSETTS

STROPHANTHIN. XIX. THE DEHYDROGENATION OF STROPHANTHIDIN AND GITOXIGENIN

IN the course of our investigation of the structure of the cardiac aglucones a number of these substances have been submitted to the action of dehydrogenating agents with the hope of obtaining reaction products which would point to the structure of the fundamental hydrocarbon skeletons upon which these aglucones are built. Following preliminary inconclusive experiments with platinum black and sulfur, the use of the selenium method of Diels, Gädke and Körding[1] has been employed and has given results of a more promising character. The preliminary observations with strophanthidin and gitoxigenin are as follows.

STROPHANTHIDIN

A mixture of 45 gm of strophanthidin and 65 gm of selenium was heated in an atmosphere of nitrogen for 45 hours at 330–340°. The chloroform extract of the reaction mass yielded a thick oil. A preliminary distillation of this material at 2 mm gave 12.3 gm of semi-crystalline substance which when refractionated at 2 mm gave the following hydrocarbon fractions.

Fraction I. −190°. 1.9 gm of a thick yellow oil which crystallized only partially on standing.

Fraction II. 190–210°. 3.9 gm of partly crystalline material.

Fraction III. 210–230°. 1.9 gm mostly crystalline.

Fraction IV. 230–250°. 1.6 gm mostly crystalline.

Fraction I gave a picrate in alcoholic solution which after recrystallization from an alcoholic picric acid solution was reconverted into the hydrocarbon. This separated at first from alcohol as shining plates which melted at 112–115°. After four recrystallizations from alcohol the melting point was raised to 130–134°. Analysis gave C 92.99, 93.26; H 6.55, 6.88. Calculated for $C_{18}H_{16}$: C 93.05, H 6.95.

The molecular weight determined in camphor gave 228, 212. Calculated for $C_{18}H_{16}$: 232.

Fraction II, after pressing off the oil, gave plates from alcohol which at first melted at 180–195°. After successive recrystallizations from alcohol, acetic anhydride and benzene it melted at 230–237°.

Analysis gave C 93.29, 93.34; H 6.09, 5.92.

Fraction III, after pressing off adhering oil and recrystallizing from alcohol, first melted at 195–210°. After repeated recrystallizations from acetic anhydride, benzene and finally thiophene it melted at 240–245°.

Analysis gave C 93.64, 93.41; H 6.29, 6.25.

Fraction IV was obtained as plates from alcohol. After repeated recrystallization from acetic anhydride, alcohol and thiophene a faintly yellow substance was obtained, which melted at 285–292°. This hydrocarbon was practically insoluble in alcohol, ether, petroleum ether and acetone.

Analysis gave C 93.66, 94.00; H 5.71, 6.04. Calculated for $C_{23}H_{18}$: C 93.83, H 6.17.

The molecular weight determination gave 310, 315. Calculated for $C_{23}H_{18}$, 294.

GITOXIGENIN

When gitoxigenin was dehydrogenated with selenium about 20 per cent. of its weight of hydrocarbon was recovered. This was separated roughly into two fractions. The lower fraction was an oil which slowly and incompletely crystallized. This was converted first into a picrate which after recrystallization was reconverted into the hydrocarbon. After two recrystallizations from alcohol, platelets were obtained which melted at 135–150°.

Analysis gave C 92.80, H 6.45.

Fraction II was partly crystalline. The oil was pressed off. Recrystallization from alcohol gave platelets which melted at 195–210°. After several recrystallizations from acetic anhydride it melted at 223–230° and resembled closely in solubility and crystalline form the so-called $C_{23}H_{18}$ hydrocarbon obtained from strophanthidin.

Analysis gave C 93.70, 93.86; H 6.25, 6.06.

Owing to the great difficulties attending the isolation of homogeneous individuals from mixtures of hydrocarbons, especially where the amounts available are so limited, the observations here given may be

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[4] S. R. Williams, *Phys. Rev.* 29, 370, 1927, and D. R. Inglis, *loc. cit.*

[1] O. Diels, W. Gädke and P. Körding, *Ann. d. Chem.*, 1927, *459*, 1.