Lehrbuch der Kristalloptik, by E. B. Wilson; "Notes"; "New Publications."

SPECIAL ARTICLES

ON MAGNETIZATION BY ANGULAR ACCELERATION

Some time ago, while thinking about the origin of the earth's magnetism, it occurred to me that any magnetic substance must, according to current theory, become magnetized by receiving an angular velocity.

Thus consider a cylinder of iron or other substance constituted of atomic or molecular systems whose individual magnetic moments are not zero. The simplest ideal system of this kind is of course a negative (or positive) electron revolving about a positive (or negative) center. In its initial state the magnetic moment of the cylinder composed of all the systems is zero. If, however, it is given an angular acceleration about its axis, the resulting torque on each individual system will cause its orbit to change its orientation, or the revolving part its speed, in such a way as to contribute a minute magnetic moment parallel to the axis of the cylinder, all the systems, if alike, contributing moments in the same direction. If the revolving electrons are negative, as appears at least generally to be the case, the cylinder will become magnetized as it would be by an electric current flowing around it in a direction opposite to that of the angular velocity imparted to it.

Early in July I began some experiments on this subject, using slightly modified apparatus constructed originally for other purposes. These experiments appear to show the effect in question in the case of a large steel rod, the intensity of magnetization resulting when an angular speed of about 90 revolutions per second was produced being about $1/1500$ c.g.s. unit, in the direction indicated by theory on the assumption that the revolving electrons are negative. This effect, if substantiated by later work, will account for a minute part of the earth's magnetism, but, apparently, for only a minute part. It is the converse of the effect which has been looked for recently by Richardson.

Superposed on this effect was another, perfectly definite and unquestionable, but exceedingly difficult to account for, viz., a magnetization along the rod in a definite direction independent of the direction of rotation and of the direction of the original residual magnetism of the rod. It was not due to the jarring of the cylinder as it was rotated in the earth's field, nor to a possible minute change in the direction of its axis produced by the pull of the motor. In magnitude this effect was several times as great as the other, which became manifest only at the higher of the two speeds used.

The observations were made inductively with a ballistic galvanometer. The throws were very small, but definite, and were in opposite directions for starting and stopping.

Later on I hope to investigate this subject more thoroughly with apparatus designed for the purpose. I am sending this account to you because of the importance of one of the effects mentioned, and the fact that some months must elapse before a thorough investigation can be undertaken.

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August 5, 1909

NITRIFYING BACTERIA IN NORTH CAROLINA SOILS

IN a recent number of SCIENCE[1] Stevens and Withers present some interesting data concerning the existence in North Carolina of non-nitrifying soils. It was pointed out that 71 per cent. of 62 soil samples representing, with few exceptions, normal agricultural soils near the North Carolina Agricultural Experiment Station failed to nitrify, a state of affairs considered anomalous.

At the time of the publication of this paper the Laboratory of Soil Bacteriology of the Bureau of Plant Industry was receiving a number of soil samples from fields or plots where legume inoculation experiments were in progress. Thirty samples from crimson clover fields in North Carolina (representing nineteen counties) were submitted to a test for nitrification. Seven samples were from the Piedmont Plateau and twenty-three from the coastal-plain region.

[1] SCIENCE, N. S., XXIX., No. 743, p. 506.

The method used consisted in determining the amount of ammonium sulphate the soil would convert into nitrate during an incubation of eight days. The soils were first spread out on a clean sheet of paper and allowed to become air dry, being carefully protected against dust during this time. To 50 grams of this soil was then added a quantity of 0.4 per cent. ammonium sulphate (about 5 c.c.) sufficient to bring the moisture content to (or a little below) the optimum for plant growth.[2] No tests were carried on in solutions, it having been our experience that nitrifying bacteria do not act normally in test solutions. This fact has also been reported by Stevens and Withers.[3] The amount of nitrates found minus the amount originally found in the soil represents the action of nitrifying bacteria on the ammonium sulphate solution.

The table shows the nitrates found by this method to have been formed in thirty North Carolina farm soils.

Six tests of soil samples from other localities are included for comparison. It will be seen that while our results substantiate the point that nitrification is at a rather low ebb in North Carolina soils, yet nitrifying bacteria are generally present, and if supplied with suitable food would undoubtedly soon multiply sufficiently to cause a normal rate of nitrification.

A comparison of samples nos. 7 and 8 is interesting: no. 7, having a low nitrifying power, was from a portion of a field where crimson clover formed no nodules, and the soil gave a pink reaction; no. 8, showing fairly active nitrification, was from another portion of the same field, gave no reaction to litmus, and root nodules occurred in average numbers. This is typical of much unpublished data upon soils from other regions and leads us to believe that nitrification, nodule formation upon certain species of legumes, and the litmus reaction are correlated.

NITRIFICATION IN NORTH CAROLINA SOILS

No.	Locality. Post-office in North Carolina	Nitrate in Original Sample. p.p.m.	Nitrate Formed in Eight Days from Ammonium Sulphate p.p.m.
1	Cameron	trace	40
2	Dunn	25	100
3	LaGrange	trace	62
4	Roseboro	"	125
5	Richfield	60	125
6	Ahoskie	12	110
7	Wilson	0	20
8	Wilson	0	82
9	Salemburg	0	40
10	Gates	trace	75
11	Shine	"	98
12	Fayetteville	1	33
13	Pisgah	trace	75
14	Hobbsville	"	50
15	Farmville	"	50
16	Hayesville	"	50
17	Durham	"	60
18	Farmville	"	80
19	LaGrange	1	77
20	Sandy Ridge	trace	1
21	Jamesville	1	125
22	Haynes	0	95
23	Ayden	0	34
24	Roxobel	trace	25
25	LaGrange	4	150
26	Pink Hill	trace	59
27	Ashboro	"	42
28	Tarboro	0	1
29	Moretz	trace	102
30	Gatesville	"	32
31	Lanham, Md.	"	300
32	" "	"	100
33	" "	"	500
34	" "	"	225
35	Edgerton, Kan.	160	400
36	New Cambria, Mo.	80	500

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[2] The samples were placed in salt-mouth bottles stopped with a wet plug of cotton to maintain even moisture conditions, and were incubated eight days at 30° C. Distilled water (100 c.c.) was then added to the soil, bottles shaken for fifteen minutes, allowed to settle, filtered, and the clear solution tested by the phenol-disulphonic acid method, as described in Bureau of Soils Bulletin No. 31, p. 40.

[3] SCIENCE, N. S., XXVII., No. 704, p. 991.

SECOND ANNUAL SPRING CONFERENCE OF THE GEOLOGISTS OF THE NORTH-EASTERN UNITED STATES

ON April 23 and 24 a conference of the geologists of the northeastern United States was held in Philadelphia, Pa., at the invitation of the Mineralogical and Geological Section of the Academy of Natural Sciences. Two sessions for pre-