A. M. D. G.

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THE BULLETIN.

The Bulletin brought a successful year to a close with the May-June number and it begins a new volume with this issue. A good start was made last year, the printing staff was organized, and sufficient interest was aroused to assure the permanency of the publication. A brief report of the work was made at the Baltimore Meeting of the Association, and in particular the cooperation of a group of Woodstock theologians in doing the mimeographing and mailing and in contributing timely articles was gratefully acknowledged. Plans were discussed to lighten the purely mechanical part of the work. The making of the stencils requires the most time and pains, and experience shows that it is better to have those of each issue made by the same individual. The Woodstock men again agreed to do the printing and mailing, and volunteers were obtained so that this year each set of stencils will be cut by a different man.

Our mailing list has grown. Active members of the Association have of course the first right to receive the Bulletin. If any do not receive it regularly we wish to be informed of the fact. We shall also be glad to send it to others interested whether or not of our own Province, or any other Province. While many outside reviews are always desirous of increasing the number of paying subscribers and advertisers in order to make sure of financial success, we at present are looking especially for a larger number of readers whose interest will manifest itself by an occasional contribution. Articles on recent scientific work, on science teaching, references to books and articles, scientific activites in our schools, personal notes, in short anything which will prove of general usefulness and promote interest in science and in science teaching will be welcome. Several of our schools are opening new science buildings or will do so in the near future. Descriptions of these will prove very acceptable. Others have scientific societies among the boys. Let us hear about them. Let each reader consider these words as addressed to himself personally and let him resolve to send at least one contribution during the year. Address all such communications to the Editor, Rev. H. M. Brock, S. J., Fairview, Concord Rd., Weston, Mass.

THE BALTIMORE MEETING.

The third annual meeting of the Eastern Section of the American Association of Jesuit Scientists took place at Loyola College, Evergreen, Baltimore, on August 13th and 14th, 1924. It was most successful in every way and much enthusiasm was shown. The misgivings which some perhaps entertained that Loyola would not be able to take care of all those attending the meeting were soon dispelled. Every arrangement had been made for our comfort. Sleeping quarters had been provided at the College and High School. The pleasant weather made it possible to serve lunch on the veranda and on the lawn. Father McEneany and the members of his community were most sollicitous in attending to the wants of all. Father M. J. Ahern presided over the general meetings, and the Vice-presidents presided over the sessions of their respective sections. There were 55 members in attendance including a delegation of former professors

of science and mathematics now at Woodstock. Reverend Father Provincial was unable to attend but sent a splendid letter of encouragement. Father Sloctemeyer of St. Louis University represented the Central Section of the Association. He gave an account of his own organization and its work. A goodly number of interesting papers were read and discussed. The complete program and abstracts of the papers will soon appear in the Proceedings. All sessions were held in the new Science Building the munificent gift of Mr. George C. Jenkins of Baltimore. This fine new structure, an ornament to the new Loyola, has just been completed and most of the members enjoyed their first opportunity of inspecting its excellent class rooms and laboratories. A pleasing feature of the first day's meeting was a reception tendered to the venerable Mr. Jenkins, the donor of the building. Fathers Ahern and Coyle expressed the Association's appreciation of Mr. Jenkins' generous gift which will not only contribute much to effective science teaching at Loyola but will also prove an inspiration to science teachers throughout the Province. How few benefactors we have had of the type of this noble Baltimore gentleman. We are but following the traditions of the Society in paying due honor to one who has contributed a part of his wealth and consecrated it to the cause of Catholic education. Mr. Jenkins' graceful speech was listened to with much interest.

The business of the meeting left little leisure. However some of the members found time to pay a brief visit of inspection to the Purification Plant of the Baltimore Water Works. It is worthy of mention that the Central Scientific Company of Chicago considered the meeting of sufficient importance to send a representative with an exhibit of some of their more recent apparatus.

The election of officers for the coming year took place at the past session. Father M.J. Ahern of Holy Cross was again elected president, and Mr. J.B. Muenzen general secretary. The following were elected vice-presidents and secretaries respectively of the various sections: Biology, Father C.E. Shaffrey of Boston College, and Mr. H.C. MacLeod of Fordham University; Chemistry, Father G.L. Coyle and Mr. V.A. Gookin of Georgetown University; Mathematics, Father E.C. Phillips of Woodstock, and Mr. G.A. O'Donnell of Georgetown University; Physics, Father H.M. Brock of Weston, and Mr. J.P. Kelly of Woodstock. Father Brock was again appointed Editor of the Bulletin.

SCIENCE SUMMER SCHOOL.

After two sessions in New York State, one at Canisius College, Buffalo, in 1922, the other at Fordham University, New York City in 1923, the Science Summer School returned this year to Holy Cross, Worcester, Mass., where it has so often carried on its work in the past. The sessions began on July 22nd and ended on August 11th with classes every day except Sunday. Father H.C. Avery had charge of Biology, assisted by Mr. D.V. McCauley. Father M.J. Ahern gave instruction in Chemistry. Fathers Brock and Deppermann had charge of the work in Physics, the latter giving a series of lectures on the structure of the atom, relativity and other questions of modern physics. Father J.L. Gipprich gave instruction in Analytic Geometry, and Mr. F.W. Sohon in the Calculus. Through the good offices of Father Ahern a number of interesting scientific films were shown. Besides our own science professors there was also one representative from Canada. The scholastics teaching the sophomore and freshman classes in our colleges had their summer work at Holy Cross at the same time. During the summer school, on the Feast of St. Ignatius, Father J.N. Dinand succeeded Father J.J. Carlin as Rector of Holy Cross.

COMPARISON OF TWO METHODS OF MEASURING ANTENNA CAPACITY.

The object of this experiment was to compare the capacity of an antenna measured by a comparison method using a ballistic galvanometer with its capacity calculated from the resonance equation:

$$n = \frac{1}{2\pi\sqrt{LC}}$$

By putting this in the wave-length form and solving for C, we have

$$C = \frac{l^2}{355\ L \times 10^4}$$

where l is the wave-length in meters, L the inductance in microhenrys, and C the capacity in microfarads. The wave-length is taken from the advertized values of the several large broad casting stations within east range of Woodstock and the inductance calculated from the usual solenoid equation

$$L = \frac{4\pi^2 a^2 n^2 K}{b \times 10^3}$$

where n is the number of turns, a the radius of the coil, and b its length, both in centimeters. This is the nomenclature of the Signal Corps Handbook. "The Principles Underlying Radio Cummunication," which also gives the values for the shape factor K as a function of the ration 2 a/b. The inductance coil used in this experiment was wound with no. 26 S.C.C. wire on a card board form and had a diameter of 13.9 cms.; this was made the primary of a vario coupler, the secondary of which was connected to crystal detector. The distributed capacity of the inductances was found by experiment to be negligible for our purposes. Tuning was done entirely by taps, and was done entirely by taps, and was naturally not very sharp. However, despite the many quantities entering into the calculations, the following values for the capacity of a small antenna were obtained.

STATION	WCAP	WRC	WGY	WBZ	KDKA	
ANTENNA CAPACITY	0.00032	0.00028	0.00033	0.00042	0.00046	mf.

These values are averages of two readings from WBZ and of four from all the others; the maximum was 0.00053 from KDKA, and the minimum was 0.00022 from WRC. All these figures are at least of the same order of magnitude and agree very well with what the books give as the antenna capacity of small antennas such as this one. As this antenna was not convenient to the ballistic galvanometer, another one (slightly smaller) was put up near the physics laboratory and the following values for its capacity were found in the same way:-

Station	WCAP	WRC	WGY	WBZ	KDKA	
Antenna Capacity	0.00031	0.00035	0.00032	0.00046	0.00047	mf.

The capacity of this antenna was now measured with the ballistic galvanometer by comparison against a standard mica condenser of 0.05 mf. capacity discharged into the galvanometer through a shunt of 5. The E.M.F. was about 40 volts, supplied by 2B batteries. As no regular discharging switch was available the contact time was kept uniform by throwing the switch through the discharge position by means of a weight dropped from a constant height. Runs were made on dry days and on rainy days to see if any difference was noticeable:-

Antenna Capacity	Dry day	Rainy day
(small antenna)	0.00022 mf.	0.00075 mf.
	0.00061	0.00032
	0.00033	

(Reprint)

The capacity of the large antenna over the Main House was measured in the same way with the following results:-

Antenna Capacity	Dry day	Rainy day
(large antenna)	0.00089 mf.	0.00096 mf.
		0.00161

Setting down the averages from both methods and using only the dry weather values for the capacity, we have

Antenna Capacity	Calculated	By Comparison
(small antenna)	0.00038 mf.	0.00039 mf.

Considering the many variables entering into the calculations and the coarseness of the tuning, the agreement is very satisfactory. It is seen that even the values given by the comparison method are none too accordant among themselves. It may be that slight atmospheric conditions are responsible, since by the use of the "automatic" discharge switch the galvanometer throw with the standard condenser could be checked to 0.2 mm. easily. It is also apparent that the capacity values are larger for the higher frequency waves than for the lower, which may be due to errors in the shape factor K for very flat coils, such as were needed here to tune in such waves.

An attempt was made to calculate the capacity of the large antenna by the use of the measured inductance, but the external capacity was too large to permit any tuning at all worthy of the name. It is well known that a smaller antenna makes for sharper tuning, but we have not run across the mathematical reason for this; perhaps some of our readers can help us out. The equation for the impedance gives us:

$$Z = 2\pi nL - \frac{1}{2\pi nC}$$

and the condition for sharp tuning seems to be a large value for $\frac{dZ}{dL}$ C constant, using the conditions obtaining in our experiment. Since however, the quantity dZ/dL in this case is a constant, it is not clear why the value of the external capacity should make any difference in tuning.

By differentiating the resonance equation itself we get

$$\frac{dl}{dL} = \frac{942\sqrt{C}}{\sqrt{L}}$$

which makes the slope of the curve actually greater for increasing values of C.

Obviously this experiment is only a start; if anyone wished to carry it further it would pay to use a straight vacuum tube detector (non-regenerative) instead of the crystal, and to apply the measurements to the many C.W. stations that send only code and whose wave-lengths are fairly close to their published values.

F. W. Power, S.J.

PERMALLOY.

Some time ago it was discovered in the Bell System laboratories that certain nickel-iron alloys, when properly heat-treated, possess remarkable magnetic properties. The most startling results were obtained with alloys of approximately 80 per cent nickel and 20 per cent iron, whose permealbilities at

small field strengths are many times greater than any hitherto known. To alloys of this approximate composition was given the name 'permalloy' to stress its most remarkable characteristic, permeability.

1. Process of Manufacture:-

a) Composition:- A typical analysis gives the following:- Nickel 78.23 pct., Iron 21.35 pct., Carbon 0.04 pct., Silicon 0.03 pct., Phosphorous only a trace, Sulfur 0.035 pct., Manganese 0.22 pct., Cobalt 0.37 pct., Copper 0.10 pct.

b) Effect of Impurities:- The presence of elements other than nickel and iron is of course to be expected after any practical method of preparation. To determine their effects, samples were prepared in which the usual impurities were present in various proportions. It was found that their presence does affect the permeability of the alloys and that carbon is especially harmful. Since, however, the variations produced by slight changes in heat treatment are very large compared with those due to small quantities of impurities it was found unnecessary for most purposes to require higher purity than that indicated in the analysis above given.

c) The Manufacture:- The samples for laboratory study are prepared by melting the purest commercial nickel and Armco iron of the above composition in a silica crucible, using a Northrup high-frequency induction furnace. For laboratory purposes the billets (usually about six pounds) were reduced through the forms of rod and wire to the final form of tape 3.2 mm. wide and 0.15 mm. thick. Thin narrow tape is particularly adapted to use in experiments involving heat treatment, since it possesses a high ratio of area to volume and is easy to manipulate. The entire nickel-iron series can be worked if care is taken; hence samples of same size, shape and condition could be used for comparison purposes.

The heat treatment of permalloy is of the utmost importance. To develop its maximum initial permeability it must be cooled not only through the proper temperature ranges, but also at the proper rates. The use of the thin tape secures fairly uniform treatment of the whole volume so long as the cooling is not too rapid. Fortunately the best cooling rate is not much different from the normal rate of cooling in the open air. Temperature changes below 300 degrees C. have very little effect upon the resultant properties of permalloy, but the rate of cooling from just above the magnetic transformation temperature down to about 300 degrees C. is the controlling factor. The laboratory samples are best treated thus: They are first heated to about 900 degrees C. for an hour and allowed to cool slowly, being protacted from oxidation throughout these processes. They are then reheated to 600 degrees C., quickly removed from the furnace and laid upon a copper plate which is at room temperature.

By careful explorationin the beginning with various samples, of varying percentages of nickel and iron the region of about 80 pct. nickel and 20 pct. iron was first located as the one most promising in high initial permeability, and then the best heat treatment for this composition was found. Keeping this treatment unchanged, the best composition was again located, and found to be about 78.5 pct. nickel, 21.5 pct. iron. There is a maximum temperature in the equilibrium diagram of this binary at about 70 pct. nickel. It was at first thought that maximum permeability would also be found here, but careful testing showed that this view was erroneous.

2. Method of Permeability Measurement:-

Most of the measurement s were made in a ring permeameter of special design. The ring sample is prepared by winding twenty or more turns of the tape around a disk about 3 in. in diameter. The disk is removed, leaving a spirally laminated ring with a rectangular cross section of a bout 3.2 mm. by 6 mm. A single massive copper conductor is linked with this ring, and constitutes also the secondary ofa transformer whose primary winding forms one arm of an inductance bridge. From the bridge measurements and the dimensions of the ring, the permeability of the latter

may be readily computed. For most of the measurements a 112-cycle alternating current was used, permitting the use of telephone receivers in adjusting the balance of the bridge. The bridge method is particularly adapted for the measurement of permeability in very weak magnetic fields since amplifiers may readily be used to increase the delicacy of the bridge adjustment to almost any degree desired. In the test program measurements with fields of 0.002, 0.003, and 0.010 gauss were included, and on the graph of permeability against magnetizing field strength the straight line through these points has been extended to field strength zero. The permeability read from the graph at this point was called the 'initial permeability' of the sample.

The form of permeameter used is especially adapted to making measurements quickly and with minimum handling of the sample, since it makes use of a single magnetizing turn. The ring is laid on suitable insulating supports in an annular copper trough, and placing the copper cover on this trough completes the electrical circuit. In a modified instrument, the 'hot permeameter,' provided with a heating device, permeabilities may be measured from liquid air temperature up to about 1000 degrees C. without altering the position of the sample.

3. The Peculiar Characteristics of Permalloy:-

a) Initial Permeability:- The largest value for initial permeability of permalloy at room temperature so far found in the ring permeameter is about 13,000, more than thirty times the corresponding value for the best soft iron. How extraordinary this is may be appreciated by considering that this material, although it has a saturation value of magnetic intensity comparable with that of iron, approaches magnetic saturation in the earth's field. Unusual caution must therefore be exercised in measuring the properties of permalloy to protect the sample from the influence of stray magnetic fields.

The following diagram (Figure 1) shows the values of initial permeability in similar ring samples of permalloy and of annealed Armco iron, and small portions of the corresponding m-H curves from which they were obtained. Notice that two diagrams are needed, so vast is the difference of initial permeabilities.

b) Saturation Values:- The magnitization of permalloy at saturation was measured and it was found that it was not sensitive to heat treatment. The saturation values of magnitization per gram-atom are known to vary almost linearly with composition throughout the nickel-iron series, from 222 for iron to 59 for nickel. The value 84 which was found for the 78.5 per cent nickel alloy is therefore not abnormal.

c) The magnetic characteristics of heat-treated ring samples of the same alloy have also been determined through a wider range of field strengths by ballistic methods. Figure 5 shows the enormous susceptibility of permalloy in the weak fields so important in communication engineering. Figure 4 carries the comparison to 10 gauss showing that Armco iron has a larger saturation value. Figure 6 shows the surprising difference in hysteresis loops, carried to a maximum induction of 5,000 maxwells. The area of the permalloy loop is only one sixteenth that of the loop for soft iron. Figure 7 shows the m-B curves for these materials. The maximum permeability here shown, 87,000, which is not exceptionally high for permalloy laregly exceeds the highest values obtainable in silicon steel and of course occurs at a much lower flux density.

d) Other peculiarities:- Early in the investigations it was found that heat-treated permalloy is sensitive to strain, and the routine measurements were so conducted as to avoid this disturbing effect. Studies on the effects of strain upon permeability and electrical conductivity in straight samples, and of the converse effects of magnetization upon dimensions and conductivity have been undertaken. They have not yet been completed, but it can be stated that these effects are large in comparison with the corresponding effects in hitherto available magnetic materials.

Figure 1.
Permeability Curves For Low Magnetizing Forces.
Permalloy (upper)
Armco Iron (lower)

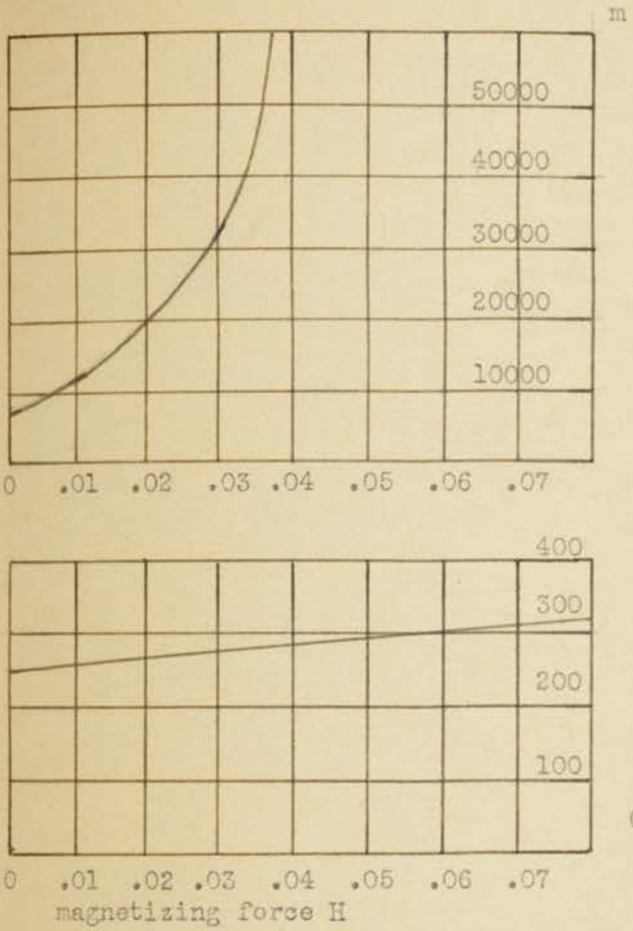


Figure 7.

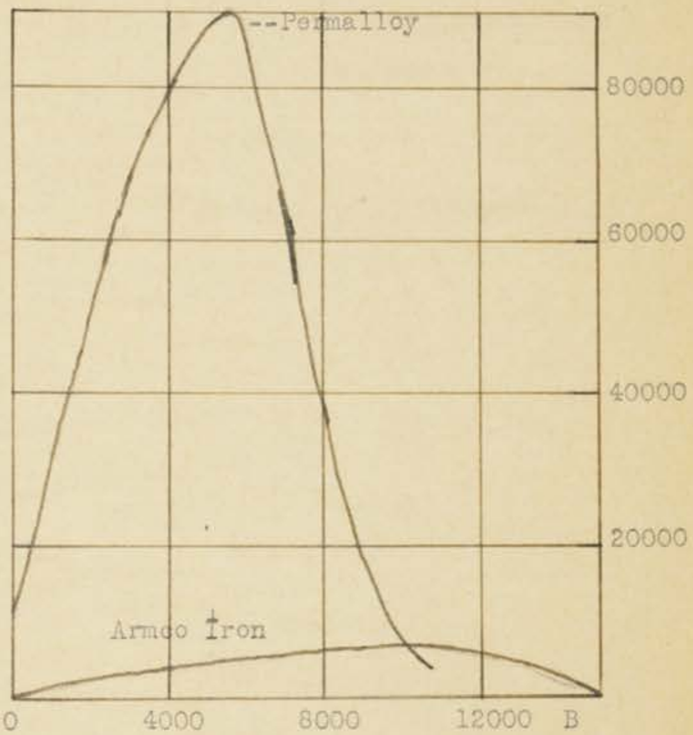


Figure 2.

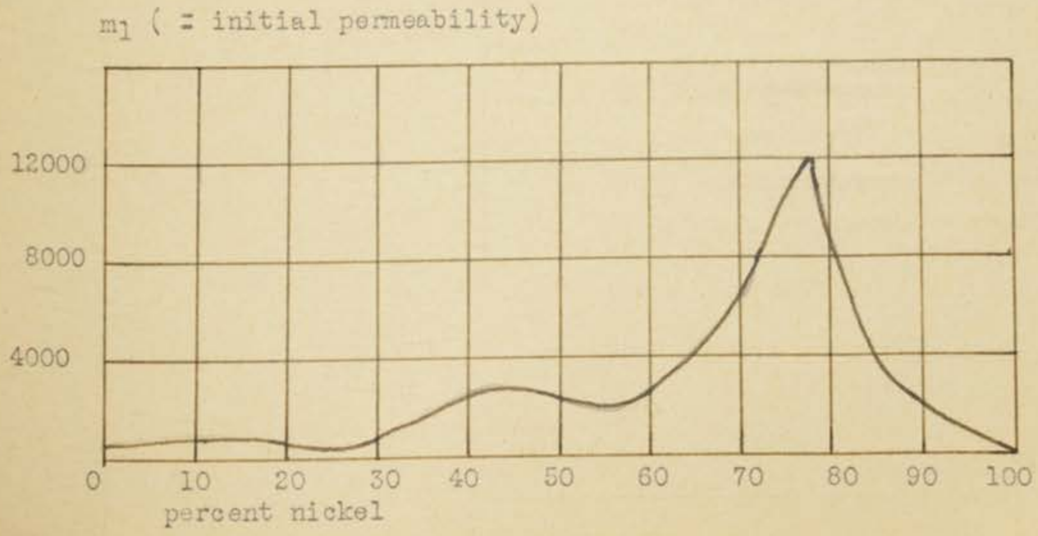


Figure 6.

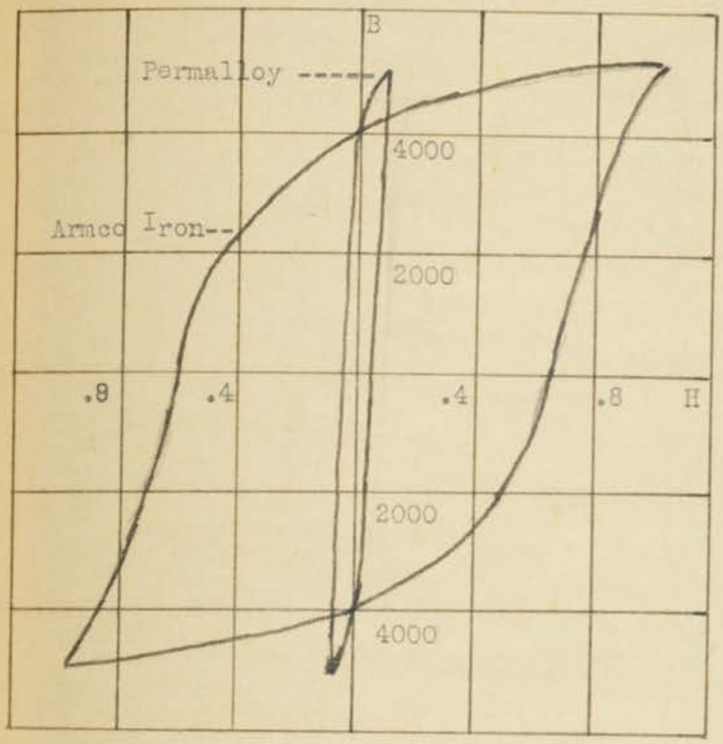


Figure 3.

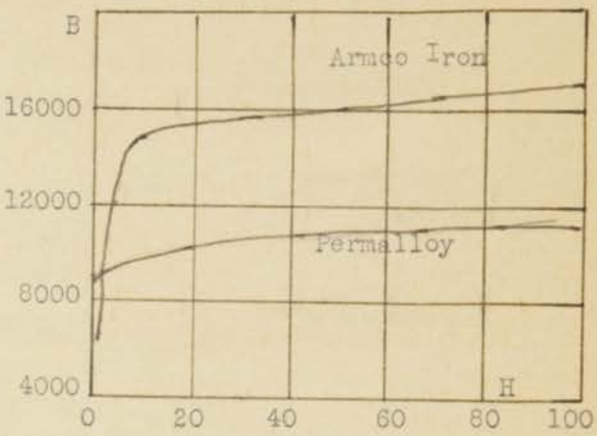


Figure 5. B-H Curves.

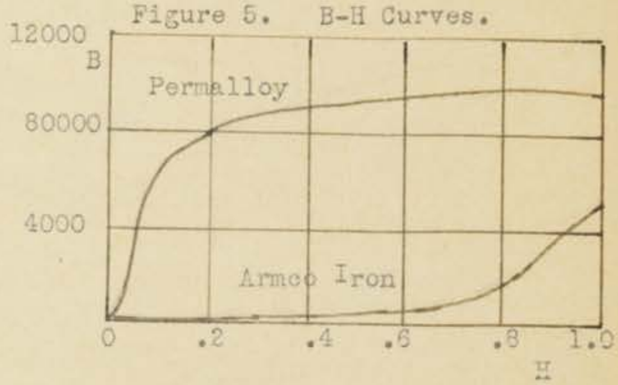
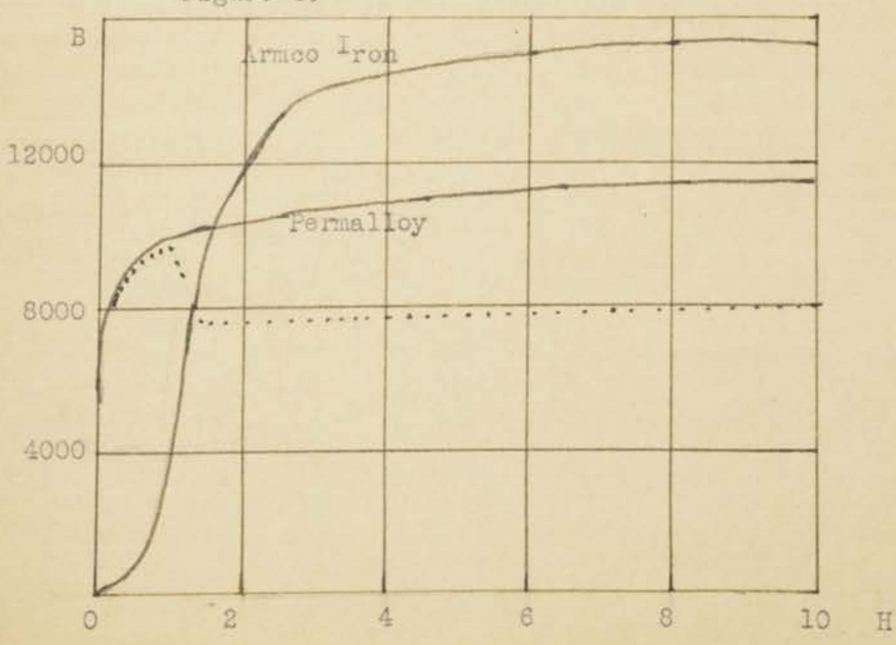


Figure 4.



So long as the elastic limit of the material is not exceeded the effects due to strain are reproducible and disappear when the strain is relieved. The effects of magnitization, however, show the expected hysteretic properties. As an example of the magnitude of the effects producible it may be stated that between its value in the unstrained condition and about one tenth that value, the initial permeability of a heat-treated strip of certain of these materials can, by the mere variation of strain, be adjusted to any value we may for the moment desire.

The range through which the conductivity can be similarly adjusted by strain is much narrower, the maximum reduction being about 2 per cent, which, however, is a large effect compared with that found in other metals. The effect of magnetization in reducing conductivity is as much as 2 per cent for fields of the order of one gauss.

Since the effects of tension on permeability is in some of these cases so marked, it seems surprising that the only reported study of the converse effect, that is of magnetostriction, indicated a zero value within the permalloy range. This study was that of Honda and Kido, in 1920; but it should be noted that their alloys had received different treatments than those studied in the present paper. Preliminary results on permalloy indicate that under usual conditions of experiment, heat-treated 78.5 per cent nickel alloy exhibits larger magnetostriction than does iron.

4. Uses of Permalloy:-

a) One of the most important uses of permalloy, and the one that the investigations of the Telephone Company's laboratory were chiefly intent upon is that of long distance telephony and of submarine cables.

The so-called 'telegraph equation' reads:-

$$KL/C^2 \cdot d^2o/dt^2 + KR \cdot do/dt = d^2o/dk^2$$

Where K = capacity per unit length, C = ratio constant, L = inductance per unit length, R = resistance per unit length.

Attenuation, distortion, etc., all arise from the troublesome second term. Hence if we make the first term very large in comparison with it, we shall be performing an inestimable service to telegraphy. L is the self-inductance of the wire per unit length, and $L = 1/2m'1 + L'$, where m' = permeability of material of wire, $L' = 2 m \log (b/a)$. In our case m' and hence L is large. If the wire is sufficiently thin in comparison with its distance from other conductors, the self-induction L per unit length becomes identical with $L- = km/K$, where k = diel. const., and m = permeability. Hence we have the relation KL = km. Now the permeability m of permalloy is very large; this therefore increases the value of KL and therefore the value of the first term of our telegraphic equation in comparison with that of the second, and hence there is a great reduction in the effects produced by the second term, attenuation, distortion, etc. (Cf. pp. 504 and 446, Jeans, Elect. and Magnet.).

b) Since the effect of magnetization in reducing conductivity is as much as 2 percent for field of the order of one gauss, for permalloy, this makes it easy to measure the earth's magnetic field to within about 1 per cent by finding the strength of the opposing field necessary to give a permalloy strip its maximum conductivity. So write Arnold and Elmen in their paper.

It is interesting in this connection to quote the abstract of a paper read by S. R. Williams of California Institute of Tech., read at the Pasadena Meeting of the Am. Phys. Soc., May 1923.

"In studying the Joule magnetostrictive effects in nickel, it was found that nickel was extremely sensitive to the effects of any extraneous magnetizing forces. If the nickel rod was demagnetized in the presence of a steady magnetic field,

the rod was always found to be magnetized in the direction of the extraneous field, even for extremely small fields. This observation has led to the following method for determining the earth's field. A short nickel rod is surrounded by two small coils and set in the magnetic meridian. By one coil a steady magnetic field is maintained and through the other is passed a decreasing alternating current for demagnetizing purposes. Near one end of the nickel rod a magnetometer needle is suspended. The rod is demagnetized in various steady fields opposing that of the earth's field, until zero deflection is obtained. At this point the opposing field is just equal to the earth's field. The method is very sensitive and accurate. A small form may be attached to a surveyor's transit, using the compass needle as the magnetometer needle. This combination enables one to determine all the components of the earth's magnetic field."

(to be continued)

Rev. C.E. Deppermann, S.J.

SOME NOTES OF INTEREST.

The Aurora Spectrum and the Upper Atmosphere:-

Professor A. Vegard, of the University of Christiana, nearly fifteen years ago, upon examination of the aurora spectrum, found that all the lines could be identified with known lines of Nitrogen, except a green line at 5577 A., and three other faint lines or bands. Since there was no trace of any lines from Hydrogen or Helium, Vegard considered that these lines must come from Nitrogen, which, however, was in some abnormal physical state. Finding that an electrified atmosphere in a highly ionized state could not exist in the form of ordinary gas, he assumed that Nitrogen at very low temperatures was condensed into clusters or small crystals.

To test out this theory, Professor Vegard has been conducting a series of experiments in Kammerlingh Onnes' Laboratory in Leyden, where he has been bombarding solid Nitrogen (formed on a copper surface cooled with liquid Hydrogen) with cathode rays, and photographing the resultant spectrum from the Nitrogen. When the cathode rays had a high potential, around 700 volts, the typical aurora spectrum was exactly reproduced by the glowing Nitrogen, the agreement being not only in the green line 5577 A., but even in the blue and violet parts of the spectrum. When the cathode ray bombardment was stopped, the solid Nitrogen Layer remained luminous for more than fiver minutes, which agrees with an afterglow of about the same duration observed actually in the aurora. These experiments seem to prove conclusively the validity of Vegard's theory that the aurora is due to the bombardment of solid Nitrogen crystals in the upper regions of our atmosphere by cathode rays, from the sun, particularly from the regions surrounding sun spots. (Cf. NATURE, May 17, 1924,p. 516.)

Nebulium.

Astronomers who are interested in the supposed element nebulium which has been postulated to explain some lines of unknown origin in the spectra of nubulae, should read the article by Harvey B. Lemon of the University of Chicago, in NATURE, May 24, 1924, P. 764. Dr. Lemon's article makes it seem highly probable that these lines may be after all only lines coming from ionized Helium.

True X-Ray Reflection Obtained.

Recently A. H. Compton (Phil. Mag., June 1924) and H. E. Strauss (Nature, July 19, 1924) have been able to obtain total reflection of the true type from glass, in full accord with Lorentz's calculated index of refraction for X-rays, i.e.

$$m = 1 - ne^2/2\pi wv^2 .$$

(Reprint)

where n = number of electrons per unit volume, w = mass of electron, e = charge on electron, v = vibration frequency of X-ray. The critical glancing angle is given by

$$\sin \theta = \sqrt{2(1-m)}$$

The wave lengths that Strauss reflected were about 1 Aengstrom unit in Length and reflection was obtained at angles of about 6', 8', 10', 12'.

A New Theory of Vacuum Discharge.

J.J. Thomson in the July, 1924, number of the Phil. Mag., gives an important new theory as to what really takes place in the vacuum discharge.

The theory may be summed up as follows:- Positive ions, on striking the cathode, emit radiation, which, falling on the cathode, causes a photo-electric emision of electrons from the cathode. These electrons emitted in this way from the cathode acquire a high speed, and cause the molecules of the gas to emit a second radiation., which in turn ionizes the molecules it encounters. The recombination of the ions so produced constitutes the negative glow. On this theory, the difference of potential between a point on the dark space and the negative glow is proportional to the square of the distance of the point from the inner edge of the glow, which has been found to be the case by Aston.

Father C. E. Deppermann.

IMPORTANT MEETING OF OURS IN ROME.

A meeting is to take place this fall in Rome of delegates from various Provinces of the Society for the consideration of a number of questions bearing on science and philosophy. It has the cordial approval of Very Reverend Father General who has commissioned Father Aloysius Gatterer, Professor of Cosmology, higher Physics and Chemistry at Innsbruck, to arrange the program and attend to necessary details. The remarkable progress of the physical and natural sciences in recent years has given rise to a number of abstruse problems. Many of these seem at first purely scientific but they nervertheless have an important bearing on philosophy. There are for example problems connected with evolution, the theory of relativity, and the electron and quantum theories and their relation to the constitution of matter. A frank discussion of these questions by an international gathering of Jesuit scholars is very timely and cannot but afford light and guidance to our Professors and Writers. Doubtless an attempt will be made to reach a common view-point on some of these vexed topics which will be both scientific and in keeping with sound philosophy. Father E. C. Phillips of Woodstock, and Father J. L . Gipprich of Georgetown are the delegates from our Province. We hope that they will give us some account of the meeting and of their experiences on their return. Father Phillips also planed to attend the conferences of the International Geodetic and Geophysical Union at Madrid from Sept. 24 to Oct. 8. He received an invitation to this meeting through Dr. William Bowie, chief of the Division of Geodsy of the U.S. Coast and Geodetic Survey who is the President of the Section of Geodesy of the International Union.

Georgetown Observatory.

Father John L. Gipprich, formerly Professor of Physics at Georgetown, has been appointed Director of the University Observatory. The Bulletin wishes him every success in his new work. While in Rome he will have an opportunity to confer with Father J. Hagen one of his predecessors at Georgetown and now Director of the Vatican Observatory. We hope that he will be able to visit some

of the principal European Observatories on his way home in order to get in touch with the work they are doing.

House of Philosophy at Weston.

Some of our readers may not have heard that for the first time all the first and second year philosophers of the Maryland-New York Province including the Regio Novae Angliae are now domiciled at Fairview in Weston, Mass. Of the last year's faculty, Father Mahoney is now at Woodstock, Father Gallagher is on the Mission Band, and Father Keyes is teaching at Boston College. Fathers Brock, J. Brosnan and Callahan came up from Woodstock. Chemistry, Biology and Physics are being taught as last year in Bapst Hall. Considerable apparatus and chemical supplies were sent up from Woodstock. The plans for the new building call for an excellent, up-to-date science department with two large lecture rooms having raised seats and all conveniences, laboratories, preparation rooms, etc. Ground was broken last spring and a bout a third of the total plant is now under construction and is to be ready for occupancy next summer at the latest. Work is going on rapidly now with the present fine fall weather. Father E. P. Tivnan, under whose wise and inspiring guidance Fordham University made such rapid progress during the past six years, became Rector at the beginning of September succeeding Father F. J. McNiff the first Superior.

NEW TELESCOPE AT WOODSTOCK.

Last June the small old equatorial telescope in the Woodstock Observatory, familiar to generations of scholastics, was replaced by a larger instrument with improved mount and clock drive. The objective has a diameter of something over four inches and was made either by Clark or Brashear. The mount was made by Warner and Swasey of Cleveland who designed and constructed the mounts of some of the world's largest telescopes, such as those of the Lick, Yerkes, and Naval Observatories. Father Phillips erected the telescope on the old concrete pier which had anew top put on. The instrument fits nicely in the dome. It was used during August to observe the planet Mars at its opposition. The observatory has been much improved by the electric light which was installed last year.

JESUIT SCIENTISTS FROM EUROPE VISIT THE PROVINCE.

Father Aloysius Cartie, Director of the Stonyhurst Observatory, and Father Gianfranceschi, Professor of Science at the Gregorian University, who attended the Meeting of the British Association for the Advancement of Science at Toronto last August visited several houses of our Province. Both paid flying visits to Weston to see the new house of philosophy. Father Gianfranceschi was also a delegate to the Centenary Celebration of the Franklin Institue in Philadelphia. Our readers will remember that he was the delegate of the Holy See to the conference of the League of Nations on the reform of the calendar. He is the author of "La Fisica dei Corposcoli."

PUBLICATIONS.

Mr. F. W. Power of Fordham University calls attention to the following reference in Chem. Abstracts, "The Constitution of Matter and Hylomorphism," by W. Jacobs, in Recueil des Travaux Chimiques de Belgique et des Pays-Bas, xlii, 609-613, (1923). This is apparently a philosophical paper. Perhaps some of our readers can tell us where this review can be consulted or purchased.

Father H. A. Judge, one of our Chaplains on Welfare (Blackwell's) Island, has a leading article in the Radio World for Sept. 13, entitled "Tubeless Set Works Loud Speaker," and another article in the same review for Sept. 20, on the "Tubeless AF Amplifier."

(Reprint)

Mr. G. J. Shiple sends us the following references to chemical literature:-

"Absolute Ethyl Alcohol," by E. Knecht and E. F. Muller, in the Jour. Soc. Chem. Industry, 1924, xliii, p. 177; abstracted in Chemical Abstracts, 1924, xviii, 2494. According to these authors ethyl alcohol can be readily dehydrated by distillation from a mixture of alcohol, glycerol and water. (Cf. Chemical Abstracts for the details.)

"Degree of Ionization of Ethyl Alcohol. I. From Conductivity Methods", by P. S. Danner and J. H. Hildebrand, in the Jour. Am. Che. Soc., 1922, xliv, 2824; also in Science Abstracts, 1923, xxvi, p. 239. It was found that the dissociation constant of ethyl alcohol was 2.89×10^{-16}, and that the fraction dissociated was 1.0×10^{-9}. These results are based on the assumptions, neither strictly accurate, that all the conducting bodies present are the ions of alcohol and these consist of H and C_2H_5O; the value found for the degree of ionization may hence be considerably too high.

"II. From E.M.F. Measurements," ibid, p. 2832. The dissociation constant of ethyl alcohol into H and C_2H_5O ions is calculated to be 7.28×10^{-20}, the fraction dissociated being 1.6×10^{-11}.

"Ionization of Alcohols," by R. J. Williams and R. W. Truesdail, in Jour. Am. Chem. Soc., 1923, xlv, 1348, abstracted in Science Abstracts 1923, xxvi, 999. The results indicate that alcohol is about 8 per cent as highly ionized as water. The nature of the method of determination, however, renders this result too high. Other investigations by the same authors show that alcohols ionize only one way, i.e. as feeble acids.

"H Ion Concentration," by E. Darmois, in the Jour. Phys. Radium, 1923, iv, 461; and abstracted in Chemical Abstracts, 1924, xviii, 1935. It is a systematic review including most of the more important work of recent years, dealing with the theory, methods of determination, and its application to various problems. The electrometric and colorimetric methods are described in detail and contrasted.

QUERY.

When ordinary friction tape is being pulled of its roll in a dark room, a sort of phosphorescence is seen at the point where the tape is "peeling off." Has any one an explanation for this?

F. W. Power, S. J.

A CORRECTION.

In our May-June number we referred to a note in SCIENCE which stated that Fathers Licent and Teilhard had discovered some ancient human remains in China. It was possibly taken from NATURE. At any rate Father Deppermann sends us the following paragraph taken from NATURE for May 31, 1924.

"NATURE, for May 31, 1924, prints the following correction:-

'In NATURE, of February 9, p. 204, we quoted a newspaper correspondent's account of the discoveries of Fathers Licent and Teilhard in the Pleistocene deposits of China. Father Teilhard now writes to correct some misapprehensions in this account, remarking especially that <u>no</u> remains of human skeletons of Pleistocene age have so far been found. Several Palaeolithic floors, however, rich in worked quartzite and the remains of Pleistocene mammals, have been explored. The small horse referred to is apparently a hemionus or wild ass, closely similar to that still living in Tibet.' "
