reports embodied much research work, painstaking investigation and laborious correspondence, and while probably neither method is extensively used just as published, the agitation over the matter accomplished much. Hillebrand's valuable paper upon silica determinations also threw much light upon the subject. The rapid determination of lime in raw materials is now largely made in this country by the method of solution in standard acid and titration of the excess of the latter with standard alkali. It has been found quicker and more reliable than the one of measuring the volume of carbon dioxide liberated, so largely used in Europe.

Newberry's method of determining magnesia by precipitation with a known volume of standard caustic soda is also much used as is Jackson's photometric method for sulphur. In 1901 the writer published his book on the "Chemical and Physical Examination of Portland Cement" which was the first book in any language treating to any extent of the analysis of Portland cement and its raw materials. Frequent papers upon the subject of cement analysis have also been published by W. B. Newberry, Hillebrand, Peckham and the writer.

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NOTES ON THE USE OF PEAT.

BY CULLEN W. PARMELEE.

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THE purpose of this paper is to review certain phases of the peat industry which are of especial interest to the agricultural chemist. As we know, the industry in all its various forms is of great antiquity on the continent of Europe and at the present time peat is being studied systematically at government experiment stations, a considerable periodical literature is devoted to the matter and there are a number of societies interested in developing its uses. In this country the industry has never flourished heretofore, chiefly for economic reasons. Of late, however, interest in the matter has been growing, and it will probably be only a short time before we give peat the same amount of serious study that it is having elsewhere.

The first point to which I would call your attention is the importance of the recovery of swamp land. Parsons, in a recent bulletin published by the New York State Geological Survey, states that "it is estimated that one-twentieth of the area of that state is swamp land" and he points out that unimproved land is assessed at about $5 per acre and the drained land sells ordinarily at $200 to $500. A similar condition undoubtedly exists in all our northern states to a greater or less degree. The practical value of this is twofold; first, the possibility of increasing the taxable wealth; second, recovering the cost of draining by utilizing

the peat removed. Similar work is done in Holland with the result that peat is the common fuel.

With respect to the usefulness of peat for agricultural purposes, the past forty or fifty years has seen a very decided change in views. In 1866, Dr. Samuel Johnson produced his very interesting book on "Peat and Its Uses." It was founded upon his observations and experiments, and his conclusions were based upon the knowledge of agricultural chemistry as understood at that time. During the years which have passed, this branch of chemistry has developed marvelously, and we cannot accept in their entirety the opinions which he gave then. For instance, with the abundance of cheap concentrated fertilizers at hand it would be foolish now to attempt to use peat as a fertilizing material. The labor of digging and spreading material having from 70 per cent. to 80 or 85 per cent. water would be too costly and the time necessary for it to become effective would be too long. In isolated communities under certain favorable circumstances it may be permissible but not otherwise.

The most important use of peat as far as the agriculturist is concerned is undoubtedly its use as litter and subsequent use as compost. Of course, not all varieties of peat are available. Only the soft fibrous material, free from lumps can be used. At present a considerable quantity is used in this country in large stables such as those of breweries, department stores, etc. We import almost all, getting it from Holland. In this country there is only one plant producing peat litter and this is located in Indiana. Not all peat litter has equal absorptive power but a good sample will absorb eight times its own weight of urine while straw absorbs only three times its weight. Moreover, peat has the advantage of preventing decomposition and loss of ammonia. As a compost material, the litter has not only the advantages named but also that of possessing a considerable nitrogen content, which, of course, is increased by that absorbed as a bedding. These matters have, however, been emphasized by other writers who give greater detail than is here necessary. I merely wish to repeat it in order to draw attention to a neglected opportunity.

A method of utilization which is at present finding considerable development is the employment of powdered peat as a filler in fertilizers. For this purpose the earthy varieties of peat are available. Here it serves the purpose of preventing the formation of lumps or crusts of hygroscopic materials. The fertilizer is consequently more easily spread. At present there are three factories operating in New Jersey and one in Illinois and possibly others elsewhere. Besides this use it is said to be used as a diluent for the preparation of low-grade dried blood.

The question naturally arises, what valuation is to be allowed for the nitrogen so introduced? It is quite unlikely that the peat

is used primarily for the nitrogen it contains, but it is there and should be differentiated from the other more available forms. Regarding this point there seems to be a wide divergence of opinions among certain authorities. Stutzer ("Die Behandlung und Anwendung des Standdüngers") says that the nitrogen of peat has no value because of the long interval of time required to render it available. Storer, in his book on agriculture, recognizes its comparative inertness but states "that it is a matter of familiar observation and experience that the peat nitrogen may be made to contribute to the support of crops and that it has consequently a considerable money value." He also quotes Nessler as follows: "Although the nitrogenous constituents of peat decompose in the soil more slowly than the altered ossein in meal from steamed bones they do nevertheless in some cases decompose more quickly than the nitrogenous components of wool, or than the ossein in coarse meal from raw bones or than those in leather meal, either that or from torrified leather."

As to the quantity of nitrogen to be found in peat, Dr. Johnson reports that he found upon the examination of thirty samples from Connecticut an average of 1.5 per cent. with a maximum of 2.9 per cent. In the course of a study of New Jersey peats, 123 samples have been examined in my laboratory. The nitrogen has ranged from 0.74 per cent. to 2.83 per cent. with an average of 1.75 per cent.

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NEW BOOKS.

ELECTRICAL NATURE OF MATTER AND RADIOACTIVITY. By HARRY C. JONES, Professor of Physical Chemistry in Johns Hopkins University. New York: D. Van Nostrand Co. 1906 viii+212 pp. Price, $2.00.

The author states that the contents of this book had been published previously, as a series of articles, in the *Electrical Review;* the present work is a revised edition of these articles. "The aim of the writer has been to present the more important facts and conclusions in connection with the work on the electrical nature of matter and radioactivity as far as possible in non-mathematical language. * * * While the work is written in semi-popular style, the attempt has been made to treat the subject with scientific accuracy." A perusal of the book shows that Professor Jones has accomplished very satisfactorily the objects announced in the preceding lines quoted from the preface.

The first four chapters deal with the electrical conductivity