classify the soils not only according to their basicity, but also according to their physical character, and the ratio of the available plant food.

The soil No. 11, for instance, is a very poor sandy soil in which the high amount of soluble phosphoric acid seems to be in excess, though the availability may be weakened considerably by the high basicity of the soil.

On the other hand, all the soils of Disózeg, (Nos. 86, 88 and 89), are heavy, loamy, or clay soils. manured very rich with nitrogenous fertilizers. In consequence of this the soil is very rich in available potassium and nitrogen, but relatively poor in available phosphoric acid. Let us hope, that in the early future we will have similar chemical, or partly bacteriological methods for the determination of available potassium and nitrogen in the soil. Then we will be able to find out the right ratio of the available plant food in the soil, and calculate with more certainty than we do now by using the ratio of the total amount of plant food in the soil.

Considering the marked harmony on the whole between the results of fertilizing experiments and the amount of soluble phosphoric acid determined by this new method, the author feels justified in calling this stock of phosphoric acid in the soil, as available.

The author would be very glad if his method could be tested by numerous chemists and on different, but well-known soils. The author has found in some instances, that taking into consideration the basicity of the soil Dyer's citric acid method may be, perhaps, also successful.

The author concludes with the hope, that in the future more attention will be paid to the chemical analysis of soils, and in drawing our conclusions we may take more and more in consideration the classification of the soils according to their chemical as well as their physical character. It is is a mistake to say that the chemical analysis of the soil has no practical value for the farmer, and the agricultural chemist should be very busy in the near future in finding reliable methods for the determination of the stock of available plantfood in the soil. The solution of this problem has perhaps more practical and international value than most other problems of the soil chemistry.

Budapest, Hungary.

THE CHEMICAL CARD INDEX OF THE PATENT OFFICE.

By Edwin A. Hill.

Received March 14, 1907.

In 1899 the U. S. Patent Office commenced the preparation of a bibliographic card index of chemical substances for use in its official work. This index, prepared by the Classification Division, now comprises nearly 500,000 cards drawn from more than 80 chemical publications, and is believed to possess sufficient magnitude to justify an attempt to open its use to the public in so far as the same does not interfere with Patent Office work.

The index has already been described in this Journal, in my paper "On a System of Indexing Chemical Literature, etc.,"[1] The system used aims to index literature as to specific chemical substances, arranged according to the following rule, viz :

The water of crystallization being rejected, write C first and H second, and the remaining elements alphabetically by their symbols.

This system resembles that used by Richter for Organic Compounds, but is broader in scope, being applied to inorganic as well as organic substances, and is simpler in the following respects, viz :

Richter, in rewriting the empirical formula also writes C first and H second, but in addition uses the arbitrary arrangement O N Cl Br I F S P for the elements which follow H in the rewritten formula, which order of precedence, while perhaps justified for the bodies of organic chemistry, has no significance whatever in inorganic chemistry.

Moreover, Richter indexes salts, and some other bodies, under the bases from which they are derived, while in our system every substance is indexed under its own empirical formula.

In addition, the Richter system has a more complex method of arrangement of the rewritten formulas than ours, and is known in the form of a printed work with supplements, appearing in literature as the "Lexikon der Kohlenstoff-Verbindungen, von M. M. Richter ;" whereas our compilation takes the form of a card index, primarily intended for the use of the corps of Assistant Examiners in making their searches on patent applications pertaining to chemical substances, and has a large portion of its space devoted to general chemical titles, classes of related substances and the names of specific bodies ; things not attempted to be covered by the Richter Lexikon.

To index all chemical literature, or indeed any considerable portion of it, from the original sources, is of course practically impossible, and our aim in brief is merely to obtain at least one good reference to all known chemical substances, collect their various names, trivial and scientific, current and obsolete, and connect them with the literature indexed under the rewritten formulas, and incidentally to preserve such chemical titles and references of a general nature, as, for example, "boiling points," "specific gravity," "molecular weights," etc., etc., as may come to hand during the progress of the work.

The index cards are of the four following varieties :

1st. Names of substances, or title cards,
2d. Classification cards,
3d. Formula cards.
4th. General chemical titles.

[1] This Journal, 22, 478-495 (1900).

As a simple and specific illustration let us take the body Sodium Chloride, which might give rise to the following cards in the index, viz:

1st. Title cards:

(a) Sodium chloride.
(b) Chloride of sodium.
(c) Salt.
(d) Sea salt.

etc., etc., each of which cards would contain the indexing formula ClNa, under which all literature would be found.

2d. A classification card, reading as follows:

"Chlorides
Sodium
See ClNa."

3d. A formula card, reading

"Cl Na
Sodium Chloride
See Remsen's Inorganic Chemistry, p. 500."

4th. The references might also give a general chemical title, as for example:

"Solubilities of Salts
Sodium Chloride
See Remsen's Inorganic Chemistry, p. 500."

The cards now in the index are housed in a Yawman and Erbe Sectional Card Catalogue case of 37 sections, each section containing 15 drawers with a total of 555 drawers, each drawer having a capacity of about 1,000 cards.

The collection naturally subdivides into two divisions, viz: an alphabetical and a formula division. The latter, or formula division at present occupies 15 sections of 225 drawers, while the alphabetical division containing the title and classification cards, and general chemical titles, uses up the remaining 330 drawers, the relative proportions of space being about two fifths and three fifths respectively, so that we now have about 200,000 formula cards available, and also 300,000 cards in the alphabetical division of the index.

In planning the index we have endeavored to make such a selection of works of a general character that when fully indexed we will probably have at least one good reference to every known chemical substance, and this having been accomplished it will be our aim to keep the leading printed abstract publications indexed closely up to date, so as to keep pace with chemical research as published.

We have already indexed the following works of reference:

Beilstein's Handbuch der Organischen Chemie, (in part).

Berichte der Deutschen Chemischen Gesellschaft, (in part).

Bibliographies of the Smithsonian Institution on the literature of Thallium, Lanthanum, Cerium, Didymium, and the Metallic Carbides.

Bolton's Bibliography of Chemistry, (in part).

Dana's Mineralogy, (last edition).

Friedlander's Fortschritte der Theerfarben Fabrikation.

Gmelins' Handbook of Chemistry, (20 volumes).

Journal Chemical Society of London, (in part).

Journal Physical Chemistry, (in part).

Journal Society of Chemical Industry, (in part).

Richter's Lexikon der Kohlenstoff-Verbindungen (which in itself contains references to over 75,000 distinct compounds of carbon).

Roscoe and Schorelemmer's Treatise on Chemistry, (11 vols.).

U. S. Patents, Class 23.—Chemicals, subclass 24. Carbon compounds.

In addition to these there have been indexed several works which contain the names and formulas of a very great number of chemical individuals, with reference to the original memoirs relating thereto, viz:

Carnelley's Tables of melting and boiling points,

Clarke's Tables of Specific Gravities,

Comey's Dictionary of Solubilities,

and it is intended to likewise index Storer's and Seidell's works on the same subject of solubilities.

The following is a list of the general works on chemistry already indexed, viz:

Barker, Geo. F., A Text Book of Elementary Chemistry.

Biltz, H., Practical Methods for Determining Molecular Weights.

Blount, B., Practical Electro-Chemistry.

Clarke, F. W., The Constitution of the Silicates.

Clowes, F., Practical and Analytical Chemistry.

Cohn, Alfred J., Indicators and Test Papers.

Dobbin & Walker, Chemical Theory for Beginners.

Fownes' Manual of Elementary Chemistry (1878 ed.).

Gattermann, L., Practical Methods of Organic Chemistry.

Hantzsch, A., The Elements of Stereo-Chemistry.

Helm, C., The Principles of Mathematical Chemistry.

Heusler, F., The Chemistry of the Terpenes.

Hurst, G. B., Painters' Colors, Oils, and Varnishes.

Jones, H. C., The Theory of Electrolytic Dissociation.

Jones, H. C., Elements of Physical Chemistry.

Landolt, H., Optical Activity and Chemical Constitution.

Lengfeldt, F., Inorganic Chemical Preparations.

Meldola, R., The Chemistry of Photography.

Mendeléeff, D, The Principles of Chemistry.

Meyer, H., Determination of Radicals in Carbon Compounds.
Meyer, L., Outlines of Theoretical Chemistry.
Moller, F. P., Cod Liver Oil and Chemistry.
Morgan, T. L. R., The Elements of Physical Chemistry.
Muir, M. M. P., Elements of Thermal Chemistry.
Muir, M. M. P., Treatise on the Principles of Chemistry.
Muir and Slater, Elementary Chemistry.
Nernst, W., Theoretical Chemistry.
Nietzski, Chemistry of the Organic Dye Stuffs.
Noyes, W. A., Organic Chemistry for the Laboratory.
Ostwald, W., Outlines of General Chemistry.
Ostwald, W., Solutions.
Remsen, Ira, An Introduction to the Study of the Compounds of Carbon.
Remsen, Ira, The Principles of Theoretical Chemistry.
Remsen, Ira, Inorganic Chemistry.
Risten, A. D., Molecules and the Molecular Theory.
Schimpf, H. W., A Text Book of Volumetric Analysis.
Schorelemmer, C., Manual of the Chemistry of Organic Compounds.
Smith, Edgar F., Electrochemical Analysis.
Thorpe, F. H., Outlines of Industrial Chemistry.
Tilden, William A., A Short History of the Progress of Scientific Chemistry.
Tilden, William A., Introduction to the Study of Chemical Philosophy.
Traube, J., Physico Chemical Methods.
Venable, F. P., The Development of the Periodic Law.
Walker, J., Introduction to Physical Chemistry.

Of course the above list will be considerably extended in the future.

It is believed this index will prove useful to inventors, patent solicitors, and manufacturers by giving a quick and easy method of finding the exact printed matter in existence relating to the substance they are interested in, and even the trained chemist who is located remote from our cities, and with a limited library, may often find it convenient to refer to this index which aims to perform the same office for the whole field of chemical literature that the index of any particular book does for the book itself.

In addition to the above obvious uses, the index will serve to show what members of an homologous series have been isolated and described, and it will also give references to the literature of all chlorides, cyanides, amides, iodides, nitrates, alcohols, etc., these general titles being found in the alphabetical part, and will also answer the question whether a supposedly new substance has ever before been described.

Parties who are able to make a personal visit to the office may often obtain the information they desire verbally without charge. Parties who desire to make use of it by correspondence, must pay the same fees as are now required for copies of other records, viz.: ten cents per hundred words, or fraction thereof, and 50 cents per hour for additional labor in the way of preparation of the matter, if such labor is required in addition to the record as it exists.

In order to avoid needless correspondence, it should be understood that in thus offering the use of this index to the public, the office does not undertake to guarantee in any way the completeness of the record, nor does it undertake to search synonyms, or to give the composition of substances having trade names, or any work of analysis of any kind whatever.

U. S. PATENT OFFICE,
Washington, D. C.

NOTES.

On the Radio-Activity of "Salt-Lime." In a paper read before the Indiana Academy of Science, November 27, 1906, the composition of the first deposit from the solar evaporation of sea water, called by the salt-makers, "Salt-Lime," was shown to be—"mainly gypsum" with about 0.65 per cent of calcium carbonate and remarkably free from traces of other salts.

It was suggested at that time that, "owing to the wide distribution of radio-active material, more or less of it must find its way into the ocean, and, judging from the probable position of radium in the periodic system, the radium ought to be found as sulphate among the less soluble constituents of the ocean water. As only thirty or forty bushels of salt lime are obtained from the evaporation of an amount of sea water which would yield 5000 bushels of salt, it will be seen that the substance represents a high degree of concentration of the less soluble material in sea water.

This fact led to the testing of the substance for radio-activity. Tests of the original material made by the method of Strutt[1] showed an activity of 18.0×10^{-15} g. of radium per gram of salt lime. This number was calculated by the use of the latest ratio (Rutherford & Boltwood) between uranium and radium, namely 3.8×10^{-7} g. of radium per gram of uranium.

Strutt finds[2] (using an older, incorrect, ratio between uranium and radium) that the activity of "sea salt" (presumably total product of evaporation of sea water) is 0.15×10^{-12} g. of radium per gram of sea salt. Using the same ratio between uranium and radium that he used in that case (7.4×10^{-7} g.) the salt lime gives an activity of 0.35×10^{-13},

[1] Pr. Roy. Soc. Series A, 77, 519.

[2] Ibid., 78, 522.