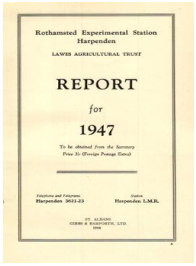
This work is licensed under a Creative Commons Attribution 4.0 International License.

Thank you for using eradoc, a platform to publish electronic copies of the Rothamsted Documents. Your requested document has been scanned from original documents. If you find this document is not readible, or you suspect there are some problems, please let us know and we will correct that.

ROTHAMSTED RESEARCH

Rothamsted Report for 1947

Full Table of Content



Pedology Department

A. Muir

A. Muir (1948) *Pedology Department ;* Rothamsted Report For 1947, pp 37 - 38 **- DOI: https://doi.org/10.23637/ERADOC-1-89**

This work is licensed under a Creative Commons Attribution 4.0 International License.

DEPARTMENT OF PEDOLOGY

By A. Muir

The work being done in the Pedology Department falls roughly into four sections: weathering of rocks and minerals, clay mineral studies, spectrographic analyses, and chemical investigations. In connection with the development of the spectrographic work the Department has been fortunate in obtaining the assistance of Prof. R. Mannkopff and Mr. H. Albrecht of Gottingen who are designing and building new apparatus.

The Soil Survey of England and Wales shares the Pedology laboratories and one or two members of the Soil Survey are collaborating in the clay mineral researches.

Weathering of rocks and minerals

A study of the weathering of the rocks of the Malvern Hills begun some years ago in the Chemistry Department and stopped during the war has been restarted in this department, the whole suite of rocks and soils having been resampled. The work includes not only the bulk changes in the rocks during weathering, but also the alteration in individual minerals and will relate these changes to the development of the soil profile. The soils of the Malverns are in general shallow and excessively drained, but there has been little or no glaciation and soils which are truly "in situ" can readily be found. In composition the rocks range from granite to appinite, a fairly basic rock, and masses of rock rich in biotite offer a good opportunity for weathering studies.

Clay mineral studies

Work which was started at Aberdeen on clay mineral complexes with organic liquids was continued in 1946. Facilities for X-ray work were kindly provided by Dr. C. A. Beevers at the Dewar Crystallographic Laboratory, Edinburgh, in the absence of suitable facilities in the Department. The results of this work have now appeared in the Trans. Faraday Soc.

In 1947 two X-ray sets were installed. One is a standard Metropolitan Vickers crystallographic unit. The other is a modification of an existing Shearer type gas tube. Power cameras of two sizes (90 and 57·4 mm.) have been designed and made for these two sets, which are now in operation.

A number of X-ray photographs of clays from Scottish podzols, which were taken at the Macaulay Institute for Soil Research, have been interpreted and the results have formed the substance of a communication to the Congress of the C.O.B.E.A. (Comité Belge pour l'Etude des Argiles) in May, 1947. This is in course of publication in "Verre et Silicates Industriels". The main results of this research are (a) the alteration of the micaceous minerals in the clay fraction, on passing up the profile, has been traced. Emphasis is laid on the progressive alteration of chlorite and biotite mica. (b) The effect of the presence of free sesquioxides in the B layer on the X-ray diagram has been traced. (c) Stress is laid,

https://doi.org/10.23637/ERADOC-1-89

This work is licensed under a Creative Commons Attribution 4.0 International License.

in general, on the importance in soil clay work of studying the clay from a number of horizons of the profile so as to get an idea of their inter-relation.

A theory of the free energy relations in clay mineral complexes has been developed, based on Bangham's adsorption measurements on mica, and has been presented to a meeting of the British Rheologists Club.

A number of clay minerals are now being fractionated with the supercentrifuge as a preliminary to doing research on fixation of ions by pure clay minerals.

Work on the adsorption of organic liquids by montmorillonite and halloysite has been extended to nitriles and a beginning has been made in the determination of adsorption isotherms from solutions of organic liquids with montmorillonite. In the latter study acetone in cyclohexane has been used but the existing methods for the determination of acetone have not proved very satisfactory under the conditions of the experiment.

Spectrographic analysis

Since the laboratories only became available in the latter part of the year the main work has been the installation and testing of equipment which includes a large (Littrow) and a medium Hilger spectrograph with ancillary apparatus. Prof. Mannkopff has designed a spectrograph with glass optics and fully automatic. This with other equipment is under construction in the Station workshop.

Gleying in soils

With a view to elucidating the mechanism of gleying in soils the problem of the stabilisation of ferrous iron by various means is being studied.

As the first stage in this work the oxidation of iron under various conditions is being investigated. It seems to be established that the readiness with which atmospheric oxygen will oxidise ferrous iron is a function of the degree of ionisation of the ferrous compound. Dilute (0·1N) solutions of ferrous salts under weakly acid conditions have been shown to be remarkably stable to atmospheric oxidation. The rate of oxidation is increased markedly, however, if the ionisation of the ferrous salt is decreased in various ways. Work is in hand to develop a quantitative relationship between the rate of oxidation and degree of ionisation. It is intended to continue this work by studying the oxidation of ferrous-organic and inorganic complexes. It seems that previous work on ferrous-organic complexes needs repeating.

Work has been started on iron-clay systems. It is intended to investigate the oxidation-reduction characteristics of these systems.

https://doi.org/10.23637/ERADOC-1-89