

Catalogue of the papers and correspondence of

LESLIE ERNEST SUTTON FRS

(1906 - 1992)

Compiled by Jeannine Alton and Peter Harper

Deposited in the Bodleian Library,
Oxford

NCUACS 51/7/94

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1994

THE ROYAL COMMISSION ON HISTORICAL MANUSCRIPTS

Report on the correspondence and papers

of

LESLIE ERNEST SUTTON
(1906-1992)

chemist

in the Bodleian Library, Oxford

Reproduced for the National Cataloguing Unit for

the Archives of Contemporary Scientists

(NCUACS 51/7/94)

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GENERAL INTRODUCTION

PROVENANCE

The material was collected from the Department of Chemical Crystallography, Oxford University, where Sutton had a retirement office.

OUTLINE OF THE CAREER OF LESLIE ERNEST SUTTON

Sutton was born in 1906, in modest circumstances. Thanks to a County Scholarship he was able to attend Watford Grammar School 1918-1923; in 1923 he won a Scholarship to Lincoln College Oxford, with further financial help from a County Major Scholarship and a Kitchener Memorial Scholarship.

At Oxford Sutton was fortunate in having as his tutor N.V. Sidgwick, who encouraged him, guided and collaborated in his early studies of thallium, and arranged for him to spend six months 1928-1929 in the laboratory of P.W.J. Debye at Leipzig learning the technique of measuring the electrical polarisation of molecules in solution. On his return to Oxford, he designed apparatus and became the leading experimentalist in this type of measurement. An early result of the work was the confirmation of R. Robinson's theories of organic reactions. Robinson supported Sutton's successful application in 1932 for a Fellowship by Examination at Magdalen College, submitted his early papers on dipole moments to the Royal Society for publication, and (Sutton believed) backed the award of a Rockefeller Foundation Scholarship which enabled him to work in L.C. Pauling's laboratory at Caltech 1933-1934. Here Sutton learnt the then novel technique of electron diffraction in the measurement of molecular structure, which became his principal programme of study on his return to Oxford.

In 1936 Sutton became a Tutorial Fellow of Magdalen, in which patrician surroundings he spent the rest of his career, retiring and being elected Fellow Emeritus in 1973 after nearly forty years as a much respected tutor and supervisor. Apart from many collaborative papers, his principal contribution was as Scientific Editor of the major compilation *Tables of Interatomic Distances in Molecules and Ions*, published in 1958 and still in use.

He was elected to the Fellowship of the Royal Society in 1950.

DESCRIPTION OF THE COLLECTION

The material is presented as shown in the List of Contents. Additional explanatory notes, information and cross-references are appended where appropriate to the separate sections, subsections and individual entries in the body of the catalogue. The following paragraphs are intended only to draw attention to items of particular biographical or scientific interest.

Regrettably, because of the accidents of survival, there are lacunae in all aspects of the material, notably in Sutton's contributions to the larger scientific life of Oxford, to professional associations and to international meetings.

Section A, Biographical and autobiographical, is principally of interest for Sutton's own autobiographical sketch. This includes an interesting account of the humble lives of his parents and grandparents, and of his own research. Characteristically, Sutton pays generous tribute to his pupils and research students, and is almost wholly reticent about his personal life.

Sections B, Notebooks, and C, Notes, drafts and publications, cover similar ground and timescale, roughly 1928-1970, documenting the development of Sutton's scientific interests. There are gaps in the records. There is no coverage, for example, of work during World War II, of the detailed preparation of *Interatomic Distances*, or of some of Sutton's most distinguished collaborators such as L.E. Orgel (though see C.11-C.13). Some of Sutton's important early work is preserved at C.4 and there are manuscript notes by L.C. Pauling at C.7.

Section D, Oxford University Laboratories, is of interest in recording the 'shoestring' running of quite major laboratories and their apparatus in the 1930s, and the invaluable work of craftsmen technicians like F.J. Marsh and S.W. Bush.

Section E, Lectures, relates almost entirely to work for the undergraduate Honours School at Oxford. There is a small number of outside lectures.

Section F, Correspondence, is somewhat scanty. Although it includes letters from distinguished individuals, often at an interesting period of their careers, the exchanges are usually rather insubstantial.

There is also an index of correspondents.

LOCATIONS OF OTHER MATERIAL

Papers relating to Magdalen College Oxford and Sutton's pupils are held by the College.

Papers relating to the Oxford University Alembic Club are at the Museum of the History of Science, Oxford.

Papers relating to the development of the electron diffraction camera are at the Science Museum, London.

J.B. Alton
BATH 1994

SECTION A BIOGRAPHICAL AND AUTOBIOGRAPHICAL A.1-A.4

A.1 Obituary of Sutton, *The Independent*, 5 November 1992.

A.2 Sutton's account of his life (photocopy) prepared for the Royal Society at various dates January 1990 - March 1992 and including a list of publications.

This document has, with the permission of Sutton's family, been drawn upon and quoted in the compilation of some of the catalogue entries.

A.3 Menus and table placements for Anniversary Dinners of The Chemical Society 1955, 1956. This is the only documentation here of Sutton's long association with the Society, of which he writes in his biographical notes: 'I enjoyed my time as Honorary Secretary of the Chemical Society (1951-1957) and then as a Vice-President (1957-1960).'

A.4 'A system for semi-continuous pedestrian crossings.' 6pp. n.d., probably 1930s.

SECTION B

NOTEBOOKS

B.1-B.15

Few of the books are adequately dated by Sutton. Attempts have been made to assign more specific dates based on the content and on Sutton's publications, and they are therefore presented in tentative chronological order.

The last item in the section, B.15, was originally a notebook of N.V. Sidgwick.

- B.1 Hard-backed notebook with thumb index, pages numbered 1-158, topic index at front. The book is inscribed 'L.E. Sutton. Coll. Linc. Oxon. Literature concerning Chemical Preparations etc.'. Sutton graduated from Lincoln in 1928.
- At front of book, notes in German and English. Includes notes on loose paper dated 1931, and later notes on thermometer errors 1942, 1943.
- B.2 Limp-backed notebook, inscribed 'Research Notes. L.E. Sutton e Coll. Linc. Oxon'.
- Miscellaneous material, including manuscript draft for collaborative paper with N.V. Sidgwick on 'The system *cyclo*-hexanol and water' (*J. chem. Soc.*, 1930), based on Sutton's Part II thesis at Oxford 1927-1928.
- Also includes notes and experimental observations on work on thallium ethoxide in benzene solution and a draft 'Investigations on some compounds of thallium', perhaps an early version of Sutton's and Sidgwick's paper 'The constitution of some organic derivatives of thallium' (*J. chem. Soc.* 1930). See also C.1.
- At rear of book, notes on papers or lectures by Heisenberg and Debye.
- B.3 Limp-backed notebook inscribed 'L.E. Sutton Lincoln College Oxford' and 'Physikalisches Institut Leipzig' where Sutton studied with Debye 1928-1929. Except for a note inside the front cover 'Ich werde in paar Minuten wieder kommen', all the notes are in English.
- Continuing work on thallium.
- B.4 Hard-backed notebook, inscribed 'Research Notes Dipole Measurements Vol. 1. L.E. Sutton e Coll. Linc. Oxon.' Thumb index at top of page to substances measured.
- No date, but Sutton in his biographical notes states 'I began measurements in about 1930 or 1931'.

Notebooks

- B.5 Hard-backed notebook, inscribed 'Research Notes. Dipole Measurements Vol.II. L.E. Sutton e Coll. Linc. Oxon.' Thumb index at top of page to substances measured.
- Similar material to B.4.
- B.6 Hard-backed notebook, inscribed 'Organic Chemistry. Preparations. L.E. Sutton, e Coll. Linc. Oxon.'
- Miscellaneous observations, calculations and graphs. Few pages dated. Begins with work on benzenes 1930-1931, some later experiments dated 1936, 1939.
- B.7 Hard-backed notebook, inscribed on front 'L.E. Sutton. Exptl. Notebook' and inside 'Magdalen College Oxford' (Sutton was elected to a Fellowship by Examination in 1932) and 'Dr. L.E. Sutton Gates Chem. Lab. Caltech. Work on Electron Diffraction by Vapours'. Thumb index of substances measured.
- Work done on molecular geometry in gaseous molecules 1933-1934 when Sutton, funded by a Rockefeller Foundation Scholarship, was working in Linus Pauling's laboratory.
- B.8 'A heterodyne capacity meter for dielectric constant measurements. Operating instructions and servicing notes. Design by R.A.W. Hill and L.E. Sutton'.
- 15pp. typescript and diagrams. Latest reference 1943. Page of notes at end continues observations on apparatus 1952-1957.
- In his biographical notes Sutton writes 'Roy Hill joined me in the work on combustion during the war and then played a very active and productive part in resuscitating electric dipole moment work'. Sutton and Hill published several collaborative papers 1947-1953.
- B.9, B.10 'Addenda to von Hippel's Table of Electric Dipole Moments, Instructions for use' and 'Supplementary Table of Dipole Moments Vol.2 1949'.
- Two small soft-backed notebooks (B.9 has lost its covers), c.1946-1949.
- B.11 Spiral-backed notebook, inscribed 'Electron Diffraction Operating Instructions'.
- Not in Sutton's hand. Intended for use in lab. N.d., but includes at rear notes on 'Plate packing device Oslo' and 'Nozzle Design Oslo' perhaps referring to joint work on acetone with O. Bastiansen and others (*Trans. Faraday Soc.*, **48**, 1952) which, Sutton writes, 'brought home to us the limitations of our technique'.

Notebooks

- B.12 Hard-backed notebook, inscribed 'L.E. Sutton Magdalen College. Notes on cyclopentadienyl-metal compounds'. Pages numbered 1-43, index at front.
- Notes on the literature 1954-1957.
- B.13 Hard-backed notebook, inscribed 'L.E. Sutton Magdalen College Notes on electron diffraction by vapours Summer 1959'. Pages numbered 2-41, index at front. See also C.19.
- B.14 Spiral-backed notebook.
- Notes taken at Sixth International Conference on Co-ordination Chemistry, Wayne State University, Detroit, Michigan. 27 August - 1 September 1961.
- B.15 Limp-backed notebook, inscribed on spine 'Electric Moments. Boiling Points' and inside 'N.V. Sidgwick'. Index at front. Few pages used. Latest reference 1935.
- At rear of book, 12pp. on German grammar, 1960. Perhaps when Sutton was brushing up his German in preparation for sabbatical leave in Heidelberg, where he lectured on *d*-orbitals. The lectures were published in book form as *Chemische Bindung und Molekülstruktur* in 1961.

SECTION C

NOTES, DRAFTS, PUBLICATIONS

C.1-C.37

These represent the contents of folders, envelopes or bundles, some with titles and descriptions which have been preserved, very few dated, and several extending over a considerable timespan. In addition to notes, diagrams and calculations, the material may include drafts for publications, and correspondence with colleagues and collaborators.

As with the notebooks in Section B, to which the material here is often connected, attempts have been made to establish a roughly chronological order and to link the work with Sutton's bibliography and biographical notes on his career and research.

- C.1 'Thesis on the constitution of the thallos alcoholates.' 50pp. typescript.
Probably Sutton's Part II Thesis 1928, supervised by N.V. Sidgwick.
- C.2 Contents of tagged folder inscribed 'L.E. Sutton Lincoln College Oxford Notes on Dipole Moment Literature.'
Miscellaneous content. Several paginated sequences. Includes 14pp. manuscript 'Notes for lecture' on dipole moment, extensive notes on the literature, some paginated, graphs of polarisation curves and boiling points. Dates mainly 1927-1929.
- C.3 Miscellaneous diagrams and drawings of apparatus by Sutton, some with headings in German. Also information on German condensers and other equipment. Some drawings probably made during Sutton's stay in Leipzig 1928-1929 and on return, prior to starting measurements in 1931.
- C.4 Notes, graphs, drafts c.1931.
Work on electric dipole measurements in benzene solution, carried out in the Dyson Perrins Laboratory Oxford on Sutton's return from Leipzig, especially on aliphatic and aromatic compounds with reference to the theories of organic reaction advanced by R. Robinson.
Includes:
Notes, calculations etc. on thallium. This is Sutton's last work on thallium. In his biographical notes he writes: 'This problem [of dipole moments and Robinson's theories] and then others relating to the structure of organic compounds so seized my interest that I never did return to that of thallium ethoxide.'
'Benzene ring', notes and calculations.
Graphs and curves.

Notes, drafts, publications

Tables of aliphatic and aromatic compounds.

10pp. typescript draft on 'Measurement of electrical dipole moments'.

'Concerning the moment of the OCH_3 group in aromatic compounds', notes, graphs, calculations.

'Robinson's theory of directive powers of groups' 11pp. manuscript notes plus 3pp. addition.

'Notes on Robinson's theory of organic reactions.' 6pp. manuscript notes plus 3pp. addition.

'The significance of the differences of dipole moment between saturated and unsaturated compounds.' 11pp. corrected manuscript draft for paper published with slight change of title in *Proc. Roy. Soc. A*, **133**, 1931, with 4pp. manuscript comments and corrections in the hand of R. Robinson.

C.5

'Electric dipole moments and resonance in molecules.'

Manuscript with corrections of paper published in *Trans. Faraday Soc.*, **30**, 1934. In his biographical notes, Sutton writes in reference to this paper: 'When I was at the California Institute of Technology in 1933-1934 I realised the relevance of Pauling's concept of 'resonance' to Robinson's theory and, indeed, that electric dipole moments provided another test of Pauling's theory'.

C.6

'The electron diffraction investigation of molecular structures ... with some applications of the results'. Manuscript of collaborative paper with L.O. Brockway published in *J. Amer. Chem. Soc.*, **57**, 1935.

Includes letter from L. Pauling.

C.7

'A wave-mechanical treatment of the Mills-Dixon effect'. Heavily-corrected manuscript of collaborative paper with L. Pauling published in *Trans. Faraday Soc.*, **31**, 1935.

Includes letter from L. Pauling and a bundle of notes by him dated September 9, 1934.

C.8

'The electric dipole moments of the hydrogen halides in solution'. 6pp. draft for a paper 'by L. Pauling and L.E. Sutton', with manuscript corrections and additions in Pauling's hand. Also includes a bundle of notes by him dated Sept. 24, 1934.

No paper of this title is listed in Sutton's bibliography.

Notes, drafts, publications

- C.9 Work by and with R.J.B. Marsden 1934-1935. Sutton describes Marsden as 'an admirable collaborator', and published two papers with him in *J. chem. Soc.* in 1935.
- Miscellaneous drafts and notes.
- C.10 'The moment of a compound with a rotating group whose axis is inclined at an angle to a fluid moment'.
- Manuscript draft and notes so titled. N.D., but a letter is clipped with the notes, March 1943, addressed to 'Dr. Woodward.'
- C.11-C.13 'Chemical bonds involving *d*-orbitals.'
- Drafts, correspondence etc. 1951-1953 relating to collaborative paper with D.P. Craig, A. Maccoll, R.S. Nyholm and L.E. Orgel published in two parts in *J. chem. Soc.* 1954. In his biographical notes, Sutton writes:
- 'From his Part II work it was clear that Leslie Orgel was promising, so I endeavoured to arrange a theoretical topic for his D.Phil. work. Stanley Rushbrooke (now F.R.S.), who then was in Oxford, agreed to take Leslie as a pupil; but at the last moment the Head of the Theoretical Physics Department, Maurice Price, F.R.S., told him that he could not take on any supervision of people not in the Department. I hurriedly consulted Charles Coulson who then was at King's College, London. He said that he had already had to refuse people, so he could not, in decency, take Leslie; but he knew two people at University College, namely David Craig (now F.R.S.) and Alan Maccoll, who had a problem on which they wanted somebody to work. So Leslie actually worked with them though I acted as his nominal supervisor so that the work could count for an Oxford D.Phil. degree. The result was a paper on bonds involving *d*-orbitals. Experimental results produced by Ronald Nyholm (later F.R.S. knighted 1967), then also at U.C.L., were relevant, so it fell to me to weave all of the results into a coherent story. This proved to be a major task, and a very educative one. The paper was much quoted. Toward the end of his D.Phil. time Leslie had ideas about what later was called ligand field theory. He wanted to present these at a Symposium of Co-ordination Chemistry at Copenhagen, in 1953, but he felt too junior and diffident to do this; so he asked me to present them. I found them quite difficult to grasp, but I managed to give a reasonably lucid account. Linus Pauling, who was there, said (a) that they were not original because van Vleck had already advanced them, and (b) that they were not necessary because he could provide an alternative treatment. We agreed that they were derived from van Vleck's ideas but emphasized that Leslie had developed them to be of more general, chemical use. Events proved that Leslie's treatment was much more usable than Linus's; and this proved to be Leslie's first step to fame. I acted as a missionary for these ideas on two other occasions.'
- C.11 Drafts, notes, calculations 1951-1953.

Notes, drafts, publications

- C.12 Draft.
- C.13 Correspondence with collaborators and editor 1951-1953.
- C.14 Correspondence, diagrams of apparatus 1952-1955, exchanged with T.E. Tomlinson and R.D. Smith, related to collaborative papers 'An apparatus for the measurement of dielectric loss in finely-divided solids' and 'A dielectric study of the adsorption of water by magnesium hydroxide' (*Trans. Faraday Soc.* **55**, 1959).
- C.15 Work on bonding. Heavily-corrected manuscript draft, pages numbered 106-145 with many intercalated pages, some dated or stamped with various dates 1955-1960.
- C.16 Work on carbon bond lengths 1956-1958, 1962.

Drafts, graphs etc., including work by and correspondence with J.S. Taylor. Also included is a note of 'Discussion with Otto Bastiansen' 1962.
- C.17 Report on a visit to Royal Dutch Shell Laboratories, May 1959, 'to enquire about characteristics of new electron diffraction camera'.
- C.18 'Report on the design and use of cameras in the U.S.A. for the study of the diffraction of electrons by vapours', October 1959.
- C.19 Miscellaneous notes and a letter on electron diffraction results 1959. Material originally enclosed in B.13.
- C.20 Correspondence on work and collaborative publications on dielectric studies 1958-1967, exchanged with A.C.D. Newman, S.M. Nelson and H.H. Huang, mainly related to papers published in *Trans. Faraday Soc.* **55**, 1959 and **65**, 1969.
- C.21, C.22 Correspondence and drafts 1959-1963 exchanged with E.W. Randall with whom Sutton published collaborative papers 1958-1959.
- C.21 Drafts, notes, calculations 1959-1960, including drafts for publications not listed in Sutton's bibliography.
- C.22 Correspondence 1959-1963.

Notes, drafts, publications

- C.23-C.26 *Interatomic distances and configuration in Molecules and Ions*
- This was published by the Chemical Society as Special Publication No.11, Sutton being the Scientific Editor. A substantial supplement appeared in 1965 as Special Publication No.18, under the supervision of Sutton, assisted by a management panel consisting of O. Kennard, H.M. Powell and D.H. Whiffen.
- In 1964 an attempt was made to raise funds and recruit professional staff to produce a second edition covering all work up to the end of 1965, but though funding was obtained from the Department of Scientific and Industrial Research the project could not be successfully carried through and was abandoned in April 1966.
- C.23, C.24 Contents of a folder inscribed 'Organization of work on Supplement to Interatomic Distances Compilation'.
- C.23 Notes and information on methods, cross-referencing etc. 1959 (and 1p. 1956).
- C.24 Correspondence with panel members, publishing arrangements 1959, 1964-1965.
- C.25, C.26 Contents of a folder inscribed 'Attempts to continue Interatomic Distances Compilation'.
- Includes fund-raising, grant application to DSIR, meetings of consultative panel, attempts (unsuccessful) at recruitment of 'compiler', abandonment of project April 1966.
- C.25 1964-1965.
- C.26 1966.

Notes, drafts, publications

- C.27 'Paper with K.P. Lawley'. Contents of a folder so inscribed.
- Correspondence and notes 1961-1963 relating to collaborative paper 'Molecular association in some gas mixtures by the pressure dependence of the dielectric constant and density', published in *Trans. Faraday Soc.*, 59, 1963. In his biographical notes, Sutton writes that Lawley 'proved exceptionally able in both experimental work and theory'.
- C.28 Drafts, notes and correspondence 1962-1964, mainly related to collaborative paper 'Conformational analysis of heterocycles : steric requirements of the piperidine lone-pair', published in *Proc. chem. Soc.*, 1964.
- Includes a letter 30 August 1962 to J.D. Dunitz in which Sutton writes: 'Today I happened to see Dorothy Hodgkin who cleared up the question about protein helices.'
- C.29, C.30 'Papers with R.J. Bishop.' Contents of a folder so inscribed.
- Bishop was a research student of Sutton and published many collaborative papers with him 1964-1970.
- C.29 Drafts and correspondence 1963-1965 relating to collaborative paper 'The study of the equilibrium constant of complex formation between phenol and pyridine in solution by a dielectric constant method', published in *J. chem. Soc. Supplement 2*, 1964.
- C.30 Drafts and correspondence 1959, 1964-1965 with Bishop and other collaborators relating to paper 'The conformation of 4-substituted epoxy-cyclopentanes', published in *J. chem. Soc.*, 1965.
- C.31 Miscellaneous notes 1963, 1964, by Bishop, on compounds measured.
- C.32 'Tropanes.' Contents of a folder so inscribed.
- Drafts and correspondence 1965 relating to collaborative paper 'The conformation of tropanes', published in *J. chem. Soc. C*, 1966.
- Includes referees' comments and correspondence arising.
- C.33 'Stilbenes etc. with A.R.K. et al.' Contents of a folder so inscribed.
- Drafts and correspondence 1965-1966, principally with A.R. Katritzky, relating to collaborative paper 'Interaction at a distance in conjugated systems. Part VI...', published in *J. chem. Soc. B*, 1966. (Some of the discussion overlaps with C.32.)
- Includes referees' comments and correspondence arising.

Notes, drafts, publications

- C.34 Diagrams for quartz absorption cell, by Sutton, September 1969.
- Letter from Sutton to J. Chamberlain relating to collaborative paper 'Far infra-red vapour-phase spectra of some metal acetylacetonates', published in *Spectrochimica Acta*, 26A, 1970.
- C.35 'Some notes relating to a joint project between Leicester and Oxford', on weak, specific molecular interactions.
- N.d., c.1972. Includes two previous research reports by Sutton for the Science Research Council, on refractive indices 1969-1971 and on spectroscopic and dielectric studies 1971-1972.
- C.36 Notes and correspondence 1972 on plans for 'future work' on submillimeter dielectric properties.
- C.37 Undated notes, perhaps early 1930s, on naphthalene and dioxane. Also 'Résumé of Tolman's lecture on thermodynamics of a stationary system'.

SECTION D

OXFORD UNIVERSITY LABORATORIES

D.1-D.16

Sutton spent his early research years at the Dyson Perrins Laboratory. In his biographical notes he writes:

'Because Sidgwick had a room in the Dyson Perrins Laboratory I worked there. Being an organic chemistry laboratory it had no mechanical workshop, but I was able to get apparatus built by Mr. Bush who had a workshop in the Pathology Laboratory and was allowed to do freelance work. He was a superb craftsman.' Work by Bush and others, and other 'outside' work for equipment and apparatus building during the 1930s is documented below.

In 1941 Sutton and his group moved to the Physical Chemistry Laboratory. In his biographical notes, he writes: 'this move meant a great gain in resources notably a first-rate workshop, better equipment generally, and very adequate space ... The move did not have an immediate effect on publication because my group was, at the time, doing war research ... but it had a profound effect on the techniques that we were able to use after the war.'

- D.1 Accounts for minor apparatus built or repaired 1927-1938, mainly sent by F.A. Lindemann at the Clarendon Laboratory to N.V. Sidgwick at the Dyson Perrins Laboratory.
- D.2 Accounts for German apparatus supplied to Sutton in Leipzig 1929.
- D.3 Accounts for repairs and work on apparatus for the Dyson Perrins Laboratory by F.J. March (University Museum) 1929-1931 and S.W. Bush (William Dunn School of Pathology) 1931-1940.
- D.4-D.6 Order books for equipment and materials for the Dyson Perrins Laboratory.
- D.4 February 1931 - September 1932.
- D.5 September 1932 - February 1934.
- D.6 February 1934 - June 1935.
- D.7 Invoices and accounts for apparatus, materials etc. for the Dyson Perrins Laboratory 1929-1939 from local Oxford and U.K. suppliers.
- D.8 Correspondence, invoices etc. from Adam Hilger Ltd. 1929-1930.

Oxford University laboratories

- D.9 Correspondence on autoclave, with Baskerville and Lindsay Ltd. 1955, 1957.
- D.10 Correspondence on refractometer, with Bellingham and Stanley Ltd., and with Hilger and Watts Ltd. 1963-1965.
- D.11 Miscellaneous correspondence on equipment and supplies 1960-1964.
- D.12 Correspondence on Ultra-Kryostats 1964.
- D.13 Notes of equipment on loan from the National Physical Laboratory to the Physical Chemistry Laboratory Oxford 1969.

Miscellaneous

- D.14 'The Chicago Benefaction.'
Lists of food parcels received from America and distributed by Sutton to various individuals in the science laboratories, various dates 1948-1950.
- D.15 'Notes to the Franks Commission' by R.E. Richards, December 1964.
- D.16 Examination material. 1 box.

SECTION E

LECTURES

E.1-E.17

E.1-1.8

UNIVERSITY LECTURES

E.9-E.17

CONFERENCE AND INVITATION LECTURES

Lectures

UNIVERSITY LECTURES

These were all given as part of the Oxford Honours School, many being repeated with minor changes over a long period of time. In his biographical notes, Sutton writes: 'As a lecturer I was a failure. I never could hold my audience ... due partly to a marked lack of what is now called charisma. I was much happier with tutorial teaching, in which I was engaged from 1936 to 1973.'

- E.1 'Atomic and molecular structure'. Contents of a folder, bearing annual dates 1947-1950.
- E.2 'Lecture notes', on atomic structure, valency, quantum mechanics etc. Contents of a folder bearing various dates Michaelmas Term 1947-1952, ending with the manuscript note 'the audience vanished in the fourth week of Hilary Term 1953.'
- E.3 'Lecture notes', on various topics in structural chemistry. Contents of a folder for Hilary Term 1949, a few pages dated 1950.
- E.4 'Lecture notes', on atomic and molecular structure. Main sequence for Michaelmas Term 1953 paginated 1-105B. Includes shorter sequence on perturbation theory paginated 1-9 and a 3pp. sequence of 'Notes supplied by C.A. Coulson 1945-1946' on 'Virial Theorem'.
- E.5 'Notes for lectures Michaelmas Term 1960. Series B', paginated B.1-B.34.
- E.6 'Shapes and sizes of molecules 1962, 1963', paginated 1-60.
- E.7 'Electron diffraction by gases'. Lecture for Physical Chemistry Laboratory 28 April 1959.
- E.8 'Applications of dielectric measurements to chemistry. Lecture for Physical Chemistry Series Trinity Term 1965'. 15pp.

CONFERENCE AND INVITATION LECTURES

- E.9 'Covalency, electrovalency and electronegativity'. 6pp. draft for paper with slides given 9 March 1950. A collaborative paper of this title with T.L. Cottrell was published in *Proc. Roy. Soc. A*, 207, 1951.
- E.10 Conference arrangements for Copenhagen and Stockholm June 1951, and Quantum-Mechanical Methods in Valence Theory, Long Island, New York September 1953. Brief information only.

Lectures

- E.11 'The derivation and use of the equations for electron diffraction'. ? April 1956. 10pp.
- E.12 'Electron diffraction by gases. Amsterdam April 1958'. 13pp.
- E.13 'Some remarks on our present knowledge of interatomic distances and molecular configurations.' Collaborative paper with D.G. Jenkin and J.S. Taylor.

Perhaps given at 4th International Congress of International Union of Crystallography, Montreal, July 1957, and based on data compiled for Chemical Society publication on interatomic distances. (See C.23-C.26.) Not listed in Bibliography.
- E.14 'The present state of electron diffraction studies of gases.' Given at Conference on Structural Studies, Keele University, 16-17 April 1964.
- E.15 'The study of molecular interactions in gases by dielectric constant measurements.' Given at Göttingen June 1964. 15pp.
- E.16 'The application of dielectric measurements to the study of molecular interactions.' May 1966. 13pp.
- E.17 'Interatomic distances, their measurement and their use in chemistry. Lecture 3.' Given at Aachen, June 1966. 17pp.

SECTION F CORRESPONDENCE F.1-F.32

The surviving correspondence is scanty. Many aspects of Sutton's scientific and academic career, as well as his long service to professional associations such as the Chemical Society, remain undocumented in this collection.

F.1	Adam, N.K.	1944
F.2	Balaban, A.T. Dipole moment measurement of boron compound.	1960-1962
F.3	Barger, G.	1935
F.4	Barkworth, E.D.P. Comments on Sutton's and Sidgwick's paper on thallium derivatives (<i>J. chem. Soc.</i> 1930).	1931
F.5	Bastiansen, O.	1958, 1960, 1963
F.6	Bennett, G.M.	1936
F.7	Bretscher, E.	1930
F.8	Bryce-Smith, D. Dipole moment measurement of esters.	1963
F.9	Chatt, J. Dipole moment apparatus.	1959
F.10	Cottrell, T.L. Apparatus. Cottrell, whom Sutton described as of 'outstanding ability', collaborated on several publications with him and others 1947-1951.	1961-1962

Correspondence

- | | | |
|------|---|-----------|
| F.11 | Cox, E.G.
Apparatus. | 1931 |
| F.12 | Downer, J.D.
Dipole measurement of sulphur-nitrogen compounds. | 1962 |
| F.13 | Ewing, V.C. (Sutton's carbon only) | 1962 |
| F.14 | Garton, C.G.
Design of transformer. | 1946 |
| F.15 | Goldschmidt, V.M.
Proposed collaborative research on properties of water molecules in soils.
Of this work, Sutton writes in biographical notes:

'There are three papers describing dielectric measurements on solid materials which had adsorbed water or other polar substances. This work was undertaken because, during the War years when I was living in College, there was a meeting in Oxford of, I think, the X-ray diffraction group of the Physical Society. I provided accommodation for Victor Goldschmidt, the eminent geochemist. He said that he was interested in the interaction between water and clay minerals: he asked if dielectric measurements might throw any light on this. I said cautiously that they might. So, in due course after the War, a grant from the Agricultural Research Council was arranged, apparatus was built and work began on the interaction of water, at low concentrations, with layer lattice minerals. The first one chosen, for supposed simplicity, was brucite [Mg(OH) ₂]. This proved a mistake in that specimens were not reproducible or stable, a fact which gave me a strong dislike for the solid state. At least it was shown that adsorbed water could cause large increases of dielectric constant. Kaolinite proved to be a much more stable material so dielectric constant and loss were measured as concentrations of adsorbate (water, ethanol or acetone), temperature and field frequency were varied. Our general, tentative conclusion was that the adsorbates were not in the ordinary liquid state but one which shows markedly the effects of adsorbent-adsorbate interaction. To have given Goldschmidt the kind of answers that he probably had wanted, i.e. what are the interactions of liquid and solid in mud, it would have been necessary to use microwave measuring techniques. This was too major an enterprise and was not attempted, rather to my regret.' | 1944-1946 |
| F.16 | Guggenheim, E.A. | 1936 |
| F.17 | Hassel, O. | 1930 |

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|------|---|------------------|
| F.18 | Heisenberg, W. | 1930 |
| | One letter only, on direction of moment in hetero-valency, and on possible moment of unshared electrons. | |
| F.19 | Henbest, H.B. | 1961-1963 |
| | Notes, diagrams and correspondence on dipole measurements of epoxy nitriles and collaborative paper published in <i>J. chem. Soc.</i> 1965. | |
| F.20 | Hückel, W. | 1930 |
| F.21 | Lack, H. | 1930 |
| | Work at Leipzig. | |
| F.22 | Mark, H. | 1938 |
| | Letter addressed to Sidgwick, on electronic diffraction apparatus. | |
| F.23 | Michels, A. | 1933 |
| | Design of apparatus. | |
| F.24 | Moffitt, W. | 1949 |
| | 'Bogus hydrogen molecule'. | |
| F.25 | Phalnikar, N.L. | 1940 |
| | Dipole moments of malonates. | |
| F.26 | Robinson, M.J.T. | 1961-1964 |
| | Dipole moment measurements. Much of the correspondence is exchanged with R.J. Bishop. | |
| F.27 | Rymer, T.B. | 1959 |
| | Electron diffraction camera design. | |
| F.28 | Sidgwick, N.V. | 1928, 1931, n.d. |
| | Brief items only. | |

Correspondence

F.29	Springall, H.D.	1945, 1948, 1960
F.30	Turner, D.	1964
F.31	Miscellaneous shorter correspondence	1930-1963
F.32	Unidentified.	

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