RESEARCHES ON CELLULOSE, II (1900-1905)

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649692446

Researches on Cellulose, II (1900-1905) by C. F. Cross & E. J. Bevan

Edited by Trieste Publishing Pty Ltd.
Cover @ 2017

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C. F. CROSS & E. J. BEVAN

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II

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LONGMANS, GREEN, AND CO.
39 PATERNOSTER ROW, LONDON
NEW YORK AND BOMBAY
1906

PREFACE

CHEMISTS of previous generations have paid relatively little attention to the amorphous or colloidal state of matter; and the appearance of uncrystallisable products of reaction, in investigations of carbon compounds, usually evoked the epithet of 'Schmiere,' applied rather as an epitaph. This procedure was perhaps the expression of a constitutional preference for bodies of certain typical physical characteristics, but actually we think it implied the recognition, partly reasoned, partly instinctive, that in the colloidal state we lose touch of the organic relationships which obtain in the great groups of carbon compounds defined and represented by constitutional formulæ.

If cellulose had been thus met with as an amorphous product of reaction—that is, in its alternative structureless forms—it might very well have been included in the heterogeneous class of 'Schmier' compounds; it certainly would not have attracted the attention of investigators to the degree of devotion of which it has been the object. It might be held that the attractiveness of 'cellulose' as a subject of investigation lies in considerations of utility, and that only its disproportionate technical importance could have supplied the motive for researches which lack the clear direction and control of the leading antecedent generalisations of the science. Obviously, on the other hand, the prominence of cellulose in the arts is the

correlative of its position in the 'natural' world; and this, its prominence in the natural order, is the basis of its attractiveness to us as students of natural philosophy.

The purpose of this volume is to record the recent advances made in our knowledge of the subject-matter, but more expressly to apply the results to the clearing of the issues contained in the question, 'What is cellulose?' The investigations of chemists through two generations have contributed a large amount of exact knowledge of the subject-matter, but the central question is unanswered, and there are very few attempts at its solution.

During the period 1900–05 there have appeared some valuable contributions to the science of the subject, the more important of which we have reviewed in this work. We have ventured to add some critical notes, which we hope will rank as a criticism of appreciation: the intention being to point the particular contributions to the issues contained in the central question, on which the authors themselves are, for the most part, silent.

Our main purpose is to establish, at a juncture which we consider to be critical, as it is favourable to progress, the definitely agnostic position, which involves the recognition of current views of the constitution of cellulose as inadequate, reopens the matter from a more comprehensive point of view, and reduces all or any interpretations of the experimental quantitative facts to their present actual level of 'theoretical' anticipations of final generalisations. In the next place we desire to state the grounds for a considerable widening of the scope of the investigations which will be necessary for reaching such final generalisations of inclusive and exclusive value. There have been many attempts to solve the problem of the constitution of cellulose in terms of molecular formulæ. These essays postulate 'molecules' as the ultimate reacting units of

cellulose, and generally extend the analogies of the 'molecular state' to bodies of this class without, we think, sufficient inquiry as to whether such methods of interpretation are really adequate. There are valid grounds for a considerable modification of these methods of interpretation and an extension of the experimental investigations, in order to pass from a sphere of discussion which is rather academic than real, into a more direct and comprehensive attack of the fundamental problem, 'What is cellulose?'

In dealing with the subject from this point of view, we certainly put scientific before industrial developments, at the same time recognising that these terms rather lose their significance in a region where the industrial developments are entirely scientific in character, and 'theoretical science' has not suggested any positive directions of progressive investigations. From the present, however, we consider that the lines of industrial progress will be rather directed by the application of general theory than the pursuit of technical objectives, and we have endeavoured to illustrate this conclusion in the indications of investigations which are urgently needed for the immediate solution of technical problems, and ultimately as a contribution to the solution of the central problem.

We are indebted to our friend Prof. Sir William Ramsay for important suggestions, and we also wish to recognise the valuable assistance of our collaborator, Mr. J. F. Briggs, in the production of this work.

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