

**NOTES ON CHEMICAL
RESEARCH: AN ACCOUNT OF
CERTAIN CONDITIONS WHICH
APPLY TO ORIGINAL
INVESTIGATION, PP. 1-66**

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NOTES ON
CHEMICAL RESEARCH



MICHAEL FARADAY

TEXT-BOOKS OF CHEMICAL RESEARCH AND ENGINEERING

NOTES ON CHEMICAL RESEARCH

AN ACCOUNT OF CERTAIN CONDITIONS WHICH
APPLY TO ORIGINAL INVESTIGATION

BY

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"Whoever could make two grains of corn, or two blades of grass, to grow upon
a spot where only one grew before, would do more essential service to his country
than the whole race of politicians put together."—*Swift*.

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PREFACE

MODERN science is based on the record of past investigation. This condition must therefore apply to chemistry, which is essentially an experimental science.

While original investigation remains an important factor in further progress, those engaged in any branch of science must have some knowledge of the general conditions under which such work has been undertaken in the past ; and realise that it can only be undertaken by an investigator who has reached a stage in his development, at which he is able to think in terms of his science. He must become one with his work.

A mere knowledge of facts and principles, however complete in itself, is an insufficient equipment. A student may possess this, and yet occupy an isolated position. Many who seem well qualified by examination, or otherwise, fail in the initiation of such work, for they cannot make practical use of such knowledge and apply it to the further investigation of natural phenomena.

Other important conditions are involved in work of this nature. They are of little account in the absence of this controlling factor, which brings with it the power of *seeing into things* and realising the relative importance of observations made under definite conditions, and the correctness, and value, of any deductions arising from the same.

An attempt has been made to state, in general terms, the conditions which have been regarded as essential to success. The influence and importance

of the results already obtained by investigation have been generally noticed, and the recent advance in the conditions of training and facilities for research has not been overlooked.

The student must give special attention to the theoretical side of his science, and train his mind to discover in the recorded work of others, the conditions which have led to success; examining the why and wherefore of each step, as it occurs in its natural, and therefore logical, sequence.

Such intangible factors as mental outlook and personal qualifications can only be dealt with in a general way, and then chiefly by reference to the experience of past investigators. It is equally difficult to determine, from available data, to what extent these faculties may be developed, or actually created by training. It is certain, however, that when these are present, the battle has yet to be fought out in the laboratory, or works.

An insight into such matters may be gained by examining the results obtained by others. A general knowledge of the conditions involved must be possessed by those who wish to succeed in the conduct of such work. In some cases, a survey of past investigation may be the simplest way to secure this end. A search of this nature will often suggest the need for further investigation, and supply the investigator with suitable subject matter for research. This end may also be secured by the study of abnormal phenomena, which may from time to time be observed in actual practice, particularly when these occur on an industrial scale.

A satisfactory knowledge of the conditions which govern such investigation is of importance to the general chemist. It cannot fail to influence the conduct of routine work, and instil into it a new meaning.

Generally speaking, the laboratories of our lead-

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ing colleges and technical institutions offer facilities for the conduct of such work. When these are examined, and considered, in conjunction with those which exist elsewhere, it is evident that still more attention will be paid to investigation of this nature. This must greatly influence, if not determine, the future of our industries, as well as our position in the scientific world. That this fact is being more and more realised is sufficiently obvious.

It is hoped that the publication of this small work may induce the student to realise at an early stage certain essential conditions which must necessarily govern his future work, and emphasise the value of those personal qualifications which can be recognised as influencing the work of investigators in the past.

THE AUTHOR.

LONDON.