

**INTRODUCTION TO MODERN
CHEMISTRY, EXPERIMENTAL AND
THEORETIC; EMBODYING TWELVE
LECTURES DELIVERED IN THE ROYAL
COLLEGE OF CHEMISTRY, LONDON**

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Introduction to modern chemistry, experimental and theoretic; embodying twelve lectures delivered in the Royal College of Chemistry, London by A. W. Hofmann

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COLLEGE OF CHEMISTRY, LONDON**

W. T. WENZELL,
San Francisco, Cal.

INTRODUCTION

TO

MODERN CHEMISTRY

EXPERIMENTAL AND THEORETIC.

EMBODYING

TWELVE LECTURES DELIVERED IN THE ROYAL COLLEGE OF
CHEMISTRY, LONDON,

BY

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THE HISTORY OF ENGLAND

QD31
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1866

TO
SIR JAMES CLARK, BART., M.D., F.R.S.
PHYSICIAN TO HER MAJESTY THE QUEEN.

MY DEAR SIR JAMES,

Two motives, either of which would be adequate, inspire me with the wish to dedicate this work to you.

In the first place, the lectures it embodies were delivered in an Institution of which, under the auspices of the illustrious Prince Consort, you were one of the principal founders,—and which owed its passage through the perils of infancy mainly to your unremitting and strenuous support.

In the second place, appearing, as this book does, at a moment when duty calls me away to labour in another sphere, it affords a particularly fitting occasion for the acknowledgment of my deep debt of gratitude to one whose sympathy has so kindly and constantly sustained me in endeavouring to promote, in the country of my adoption, the great cause of chemical education.

Not for any intrinsic merit of its own, but as one effort more in that noble cause, you will accept, I am persuaded, my dear Sir James, the dedication of this little work in token of my sincere regard and unalterable friendship.

A. W. HOFMANN.

London, March 25, 1865.

428.111



P R E F A C E.

THE following pages contain, in their latest form, with some additional developments, the introductory portion of the chemical course which the Author has annually delivered, during the last fifteen years, in the theatre of the Royal College of Chemistry.

The juncture of chemical history at which this little book is published, and the peculiar educational necessities which that juncture implies, are reflected as well in the substance as in the method of the work; the purport of which will, therefore, be best made known by a brief reference to the present posture of chemical affairs.

No chemist will need to be reminded that, during the last quarter of a century, the science of chemistry has undergone a profound transformation; attended, during its accomplishment, by struggles so convulsive, as to represent what, in political parlance, would be appropriately termed a Revolution.

Amidst continual accessions of fact, so rapid, so voluminous, and so heterogeneous, as almost to exceed the grasp of any single mind, chemical science has been in travail, so to speak, with new laws and principles of co-ordination, engendered, perhaps, partly by the sheer force of their own deeply-felt necessity, but partly also, and mainly due, to the powerful initiative impulsion of a few philosophical master-minds.

Based on the concurrent examination of the volumetric and

ponderal combining-ratios of certain typical elements, and on the recognition, in their standard combinations, of a few well-marked structural types, these principles have introduced into the domain of chemistry the pregnant idea of *Classification*—the conception of a series of natural *Groups*, resembling the genera of the biological sciences, and culminating in the establishment of an orderly *System*, where before there had seemed to be but a chaos of disconnected facts.

Under the influence of these and certain other cognate ideas, new views have arisen as to the constitution and chemical properties of matter; a reformed chemical notation has thence of necessity ensued; and structural relations, previously unsuspected, have disclosed identity of parentage in compounds till then deemed utterly diverse.

It appears to be wisely ordered, in scientific as in social affairs, that the innovating spirit which belongs to Youth has its check and counterpoise in the conservative tendency essentially characteristic of Age; so that, in the sharp collision of these rival forces, new principles, in any kind, find a sort of fiery ordeal interposed between their first enunciation and final acceptance; doubtless the appointed test of their soundness and vitality.

Hence the domain of chemical philosophy has, for many years past, rather resembled a tumultuous battle-plain, than a field bestowed by nature for peaceful cultivation by mankind. The new ideas, springing up of necessity one by one, and not always free, at their first conception, from errors and inconsistencies, have been resisted, by the champions of the old chemical dogmas, as a gratuitous revolt against established authority. Controversy has naturally stimulated research, which, in its turn, has produced rapid modifications of theory; so that the aspect of chemistry has been in a state of incessant change. It is, indeed, only within the last few years that the new doctrines have acquired a

logical consistency, and a consequent ascendancy throughout Europe, auguring at length, for our long-agitated science, a period of comparative calm.

The Author's chemical lot, both as a student and as a teacher, has been cast amidst the storms of this controversial period; in which he has felt it his duty to take part on the side of innovation.

During the lengthened period which he has passed in tuition at the College of Chemistry, the task imposed on him has been, to hold the balance fairly between the old views and the new; between authorized conceptions, evidently on the wane, and novel generalizations still awaiting final proof; so that his teachings may have sometimes almost seemed to resemble those dissolving scenes, which, at a certain moment, present two landscapes, one in the act of melting away, while the other is unfolding itself to view.

It will be readily understood that a printed record of such discourses, though frequently and earnestly solicited by pupils, could scarcely have possessed any permanent value, had it been produced amidst the doubts, and reflected the half-truths, of a period so eminently transitional. It will also be felt that its publication has become more opportune, now that a consistent body of doctrine, novel, yet based on irrefragable fact, can be put forth as undoubtedly permanent.

It will be apparent from the above remarks that this work is of an essentially general and introductory character, designed to elucidate the leading principles of chemistry, and by no means presented as an encyclopædic compendium of its facts. So far, indeed, from seeking to multiply details, it has been the author's chief care to avoid them, and to enter upon descriptions of phenomena only in subordination to his main design. This will, perhaps, be most readily gathered from the brief résumé of these lectures, with which the last of the series concludes.