

**RUDIMENTARY  
CHEMISTRY: FOR THE  
USE OF BEGINNERS**

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Rudimentary Chemistry: For the Use of Beginners by Geo. Fownes

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**GEO. FOWNES**

**RUDIMENTARY  
CHEMISTRY: FOR THE  
USE OF BEGINNERS**



RUDIMENTARY CHEMISTRY

FOR

THE USE OF BEGINNERS.

BY

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LATE PROFESSOR OF PRACTICAL CHEMISTRY IN UNIVERSITY COLLEGE, LONDON.

TO WHICH IS ADDED,

AN ESSAY ON THE APPLICATION OF CHEMISTRY  
TO AGRICULTURE.

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Museum of Zoology

DURING a visit at Barbados, Professor FOWNES wrote and gave me the manuscript of this little book. I print it especially for the Barbados School of Practical Chemistry, but at the same time with the confident hope that it will be widely circulated beyond the limit of this Island.

WM. REID, Governor.

*Barbados, January, 1848.*

June 1902  
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## PREFACE.

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IN all branches of human knowledge, depending upon experimental evidence, recourse must in teaching always be had to a double system of instruction; the interest and attention of the pupil must first be aroused and excited by experiments of a striking and yet suggestive nature, which may tempt him to thought and inquiry; to satisfy which, in part, a small elementary treatise on the subject may be put into his hands with advantage. If this be favourably received, and in some measure mastered, he will be in a condition to attend with great profit an extended course of well-illustrated lectures, and also in his intervals of leisure to peruse some systematic treatise on the subject, the hearing and reading being so combined, that the one shall throw light upon the other, and call into activity both judgment and memory. And this method of proceeding is especially applicable to Chemical Science, which rests entirely and exclusively on experimental demonstration, and to which the resources of Mathematics have not yet been applied.

In the hope of facilitating the acquisition by the pupil of a few general ideas respecting Chemical Science, the present rudimentary work has been drawn up. It is hoped that, from the little said, the desire to know more may be excited in his mind. But these and all such means will certainly fail unless an opportunity of seeing experiments themselves, or, best of all, of assisting at such experiments, be afforded. Chemistry can never be

learned by reading: it is in the lecture-room or the laboratory that the pupil makes, as it were, personal acquaintance with the different substances concerned; an acquaintance which is afterwards extended and rendered more perfect by the judicious perusal of books.

It is difficult to exaggerate the advantages which would result to individuals and to the community, if the elements of Natural Philosophy and Chemistry were regularly and systematically taught in schools, even those intended for the humbler classes of society. To say nothing of the positive gain which such knowledge would often prove in the common pursuits of life, being at every step so directly applicable to practice, the elevation and purity of mind which result from a taste for the study and observation of nature are surely most favourable to the advancement of the end and aim of all education—to qualify men for the faithful and true discharge of the duties and obligations of life, while awaiting with humility and hope the mysterious development of existence yet to come.

GEO. FOWNES.

*Barbados, January 1st, 1848.*

## PREFACE

TO THE SECOND EDITION.

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THE scientific writers who have been engaged in preparing the Rudimentary Treatises, of which the lamented Professor Fownes's work formed the first, having treated their respective subjects in greater detail than was done in the Rudimentary Chemistry, and the great success of the Series appearing to sanction this extension, the Publisher has found it necessary to enlarge this treatise. Professor Fownes himself shortly before his death had revised the work, and made a few additions; but, these not being sufficient, the Editor has added an Appendix, founded upon a suggestion contained in the eloquent passage at the conclusion of the work:—"We are already permitted to see more or less perfectly many links of this wonderful chain of actions; we see the carbonic acid, water, and ammonia, bone earth and the alkalis, restored to the air and the earth by the breathing of the animal during life, and by the decay of its body after death, employed in forwarding the growth and maintenance of another and different race of organic beings, the vegetables, namely, of the field and forest, which under the influence of the sun's light decompose this carbonic acid and ammonia, restore a great part of the oxygen to the atmosphere, and employ the remaining elements in the formation of those complicated products of or-