

**PRACTICAL CHEMISTRY
FOR USE IN SCIENCE
CLASSES AND HIGHER AND
MIDDLE CLASS SCHOOLS**

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Practical Chemistry for Use in Science Classes and Higher and Middle Class Schools by J. Howard

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J. HOWARD

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PRACTICAL CHEMISTRY.

Putnam's Elementary Science Series

PRACTICAL CHEMISTRY

FOR USE IN

SCIENCE CLASSES AND HIGHER AND MIDDLE

CLASS SCHOOLS

BY

J. HOWARD

HEAD MASTER OF THE BURLINGTON SCHOOL OF SCIENCE AND ART



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P R E F A C E.

THE present work has been prepared to supply the want—frequently felt by many Teachers and Students of Chemistry, preparing for the examinations of the Science and Art department—of a method, by which the subject could be studied, so as to get a sound knowledge of the elementary facts of the science.

The reports of the eminent men who act as examiners for the Science and Art department have shown, that many students who come up for examination are mere readers, and they rightly decry such a system of *crash*, which can only produce nausea instead of that deep interest in the phenomena surrounding us, which would be produced if science were really studied practically. These views the author fully appreciates. He has for some years taught large classes of young men and boys who have been successful at these examinations, and feels assured that Chemistry cannot be understood unless EXPERIMENT go hand-in-hand with Theory—in fact, that Theory should be built up by the aid of inferences drawn from the experiments themselves.

In addition to this, the Department have offered to assist the individual study of Chemistry by Grants to the Committees towards the expenses of students in a laboratory, and also in extra payments to the teacher. These grants, however, can only be obtained by the student showing at the examinations a good knowledge

of Practical Chemistry, and it is believed there is very little chance of getting a *first class* without it.

The teacher, and, if possible, every student, should perform all the experiments described in the book. It will be found to contain all that are suggested in the revised syllabus of the subject for the First or Elementary stage, and many others besides.

The author is indebted to the series of Lectures delivered from time to time by Dr Frankland, and also to his "Lecture Notes on Inorganic Chemistry," for the method of treating the subject, and for many of the explanations of Chemical phenomena given throughout the work. To this work, and to the work on Inorganic Chemistry in the present series, the author would refer the reader for further information on the theoretical part of the subject.

The illustrations in the book are principally from photographs of the actual apparatus used, kindly taken by an old pupil. A few from drawings by another friend.

J. HOWARD.

LELINGTON SCHOOL OF SCIENCE AND ART,
October 1872.