

**LAWS OF PHYSICAL
SCIENCE; A
REFERENCE BOOK**

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Laws of physical science; a reference book by Edwin F. Northrup

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EDWIN F. NORTHRUP

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A REFERENCE BOOK

BY

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THIS COLLECTION OF NATURE'S LAWS IS
LOVINGLY DEDICATED TO AN ABLE AND MOST
HONORABLE EXPONENT OF HUMAN LAWS

My FATHER

HON. ANSEL JUDD NORTHRUP

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PREFACE

EXACT knowledge consists of accumulated facts and sets of formulated propositions respecting facts. Data, Mathematical relations and Physical laws constitute the three firm supports of Physical science and Engineering.

The *data* of physical science are readily accessible in several published tables of physical constants. The *mathematics* used in physical science has been summarized, classified and formulated, for ready reference, in many published books. The author is not aware, however, of any hand-book or reference work which contains a full list of the *general propositions or laws of science*.

Such reference lists are not without value, and this book has been prepared to fill an obvious gap in the literature of Physical Science. Furthermore, it appears to the author that students in any of the branches of Natural Science will not only find guidance, but will also derive inspiration by having before them under a single view the very epitome of the world's heritage of the fundamentals of its knowledge and wisdom. None will question that the fundamentals of science are its laws, principles, theorems and precise statements of the general properties of matter; but it is not always easy for students in one branch of science to find and to know the literature on important principles and facts in an entirely different, or even in closely allied branches of science. The author hopes that what has been here gathered together and classified will help such students in their search and give them the means to broaden their view.

We have chosen for a title, "Laws of Physical Science" but many general propositions, theorems and mere statements of important facts have been included which perhaps,

if strictly considered, could not be discriminated as laws. Indéed, it was found impossible, in many cases, to decide if certain propositions possess sufficient generality and validity to deserve the title "law." When, however, such doubts existed, a policy of inclusion has been followed in preference to one of exclusion.

For convenience and system the general statements (in all 480 with title) have been classified in six sections: I—Mechanics; II—Hydrostatics, Hydrodynamics and Capillarity; III—Sound; IV—Heat and Physical Chemistry; V—Electricity and Magnetism; VI—Light.

Each law, proposition or general statement is characterized by giving it a heading or title. Each proposition covered by a title is followed by one, and in many cases by several references to easily accessible text-books, standard treatises, and, in a few cases, to original articles or papers, where one may find the propositions stated in different forms and additional information concerning them of authoritative character.

While many laws of Physical Science have had their origin with individual investigators, the perfected form of statement they now possess has been in the main reached by a process of intellectual growth in which many have taken part. It has seemed, therefore, wiser to make most of the references to treatises and text-books on physics, physical chemistry and chemistry, rather than to papers written by the authors of the propositions. Moreover, original papers, beside containing much extraneous matter, are not usually readily accessible as are text-books and treatises.

An alphabetically arranged bibliography of all books and journals referred to and a very full index, with duplicated references, to aid in the quick location of subject matter and proper names, are included.

The author expresses his acknowledgment to Mr. H. A. Frederick for assistance in collecting some of the material used, and to Prof. K. T. Compton for his careful reading of the manuscript. He further acknowledges with gratitude the unfailing and valuable assistance of his wife, Margaret Stewart Northrup, in collecting material and in arranging it for publication.

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THE AUTHOR