

**ILLUSTRATIONS OF THE
C.G.S. SYSTEM OF
UNITS: WITH TABLES
OF PHYSICAL CONSTANTS**

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C.G.S. SYSTEM OF UNITS.



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OF THE
C.G.S. SYSTEM OF UNITS
WITH
TABLES OF PHYSICAL CONSTANTS.

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PREFACE.

THIS work, in its original form, was published by the Physical Society of London, in 1875, as "Illustrations of the C.G.S. System of Units."

A greatly enlarged edition was issued in 1879 by the present publishers, and the title was changed to "Units and Physical Constants," the letters "C.G.S." being suppressed from an idea that their strangeness would unfavourably influence the sale. This new title was retained in the "second edition" issued in 1886.

The C.G.S. units having now become the accepted standards of reference throughout the scientific world, there is no longer any reason for suppressing the name. In the present edition they are accordingly restored to their place in the title, which is thus brought into closer agreement with the contents of the book.

The German edition, which was announced in our last preface as about to appear, was published at Leipsic in 1888 by Ambrosius Barth. It is a close translation as regards the portions relating to units, but contains large changes in the experimental data, some years having been devoted to this portion of the undertaking after the original manuscript had been completed. The present edition has been closely compared with the German

rendering, and in several instances I have been glad to avail myself of the permission of the editors (Drs. Chappuis and Kreichgauer) to make use of their material.

A Russian translation was published at St. Petersburg in 1888, edited by Mr. P. N. Verbitsky and Captain J. Th. Gerabiatieff, and revised by Professor S. A. Ousoff. I am indebted to these gentlemen for pointing out several errors which they discovered in a searching scrutiny not only of the book itself but of the authorities quoted in it. They have, for example, corrected some numbers quoted from Péclet, by the aid of a table of errata in Péclet's book which I had overlooked.

The following are the principal items of new matter :—

1. A collection of determinations of viscosities of liquids and gases; in connection with which I have to express my deep obligations to Mr. Carl Barus, who lent me a large bundle of MSS., including all recent results on this subject.
2. A summary of recent investigations of the magnetic properties of iron and other substances, with the necessary expositions of theory and terminology. Under this head I have to acknowledge very special obligations to Mr. Shelford Bidwell, some six or eight pages of the new matter being substantially from his pen. I have also received valuable aid from Professor Ewing and Dr. Hopkinson.
3. A revolutionising of the introductory sections on Heat, rendered necessary by Rowland's discovery that the specific heat of water decreases by 1 per

cent. as the temperature rises from 5° to 30° C. The new sections include Rowland's results for the mechanical equivalent of heat, and for the comparison of the thermodynamic scale of temperature with the air thermometer and with a Kew standard.

4. Two sections on self-induction, mutual induction, and the theory and terminology of alternating currents.
5. Two sections on the dimensions of electrical and magnetic quantities in terms of K and μ . Under this head I have to acknowledge kind assistance from Professors Rücker and Fitzgerald.
6. A table of values of the magnetic elements at a number of stations in the British Isles, selected from the results of the recent survey of Professors Rücker and Thorpe.

Information on several subjects has been brought down to date ; including

Wave-lengths of light.

Mercury standards of resistance, and their correction for temperature.

Standards of light-giving power.

Emission of heat.

Conduction of heat by liquids.

Departure from Boyle's law at very high pressures.

Compression of fresh water, sea water, mercury, and glass, at very high pressures.

Coefficients of diffusion of liquids and gases, with a simplified exposition.