Concepts in Physical Chemistry

2nd Edition

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By

Peter Atkins

Oxford University, UK

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Preface

The first edition of this book was published in 1995. This edition has been almost entirely rewritten and every illustration has been redrawn. Some entries have been retired as physical chemistry has moved on, and new entries have taken their place. You should be aware that there are many concepts embedded in the principal entries, so you should refer to the Directory for a full list of topics included.

I am very grateful to the Royal Society of Chemistry for agreeing to make this compilation available free of charge on the web, and hope that members of the community of chemists, and their intellectual neighbours, at all levels, will find it helpful. The contents of this publication are my own personal versions of the concepts presented.

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Conventions

The conventions adopted in the entries include the following:

$\ln x$	Natural logarithm of x (base e)
$\log x$	Common logarithm of x (base 10)
$X^{\ominus}$	The standard-state value of the property X
$b^{\ominus}$	1 mol kg^{-1} exactly
$c^{\ominus}$	1 mol dm^{-3} exactly
$p^{\ominus}$	1 bar exactly
$=$	An exact (defined) numerical value
$\approx$	A derived or empirical numerical value
$\tilde{X}$	A quantity X expressed as a wavenumber (so the corresponding energy is $hc\tilde{X}$)

Many expressions in thermodynamics have the form $\sum_{\mathrm{J}} n_{\mathrm{J}} X_{\mathrm{J}}$, where J is a substance. This expression has the same form as a scalar product of the vectors $\boldsymbol{n} = \{n_{\mathrm{A}}, n_{\mathrm{B}}, \ldots\}$ and $\boldsymbol{X} = \{X_{\mathrm{A}}, X_{\mathrm{B}}, \ldots\}$. Therefore, it is possible to simplify the appearance of many expressions by replacing the sum by $\boldsymbol{n} \cdot \boldsymbol{X}$. This alternative is provided as well as the conventional form.

A *stoichiometric coefficient* is a positive number; a *stoichiometric number* is a signed number, positive for products and negative for reactants. Both are dimensionless.

In accord with established convention, physical quantities are represented by oblique Greek or Roman symbols; labels, units, and

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mathematical constants are represented by upright Greek or Roman symbols.

Note that this book is a collection of concepts; only rarely does it include physical data. For the values of fundamental constants, see the Resource Section and the relevant entries.

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