
DICTIONARY OF BIOCHEMISTRY AND MOLECULAR BIOLOGY

Second Edition

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PREFACE

This dictionary, first published in 1975, was written to provide scientists and students in the life sciences with a reference work on the terminology of biochemistry and molecular biology. The expansion of knowledge in these areas created the need for an extensive revision of the first edition. All of the original entries were checked and reworked, if necessary, in view of new information. This second edition contains approximately 16,000 entries, of which some 4,000 are new, representing an increase of about 30% over that of the first edition. The source material consulted for revision of existing terms and for addition of new terms consisted of over 300 textbooks and reference books of various kinds and of over 600 journal articles from the research literature, all of which have been published since 1975. All told, the dictionary entries are drawn from over 500 books and 1,000 articles, including the recommendations of the Commission on Biochemical Nomenclature of the International Union of Pure and Applied Chemistry and the International Union of Biochemistry. Throughout, an effort has been made to include terms recently introduced into the biochemical literature and to exclude obsolete ones, except for a few of historical interest.

The terminology of biochemistry has a number of characteristics that influenced the selection of entries. One of these is the extensive use of terms from other sciences, since biochemistry, by its very nature, draws heavily on allied sciences. For this reason, many terms from such sciences as chemistry, immunology, genetics, virology, biophysics, and microbiology have been included in the dictionary. A second characteristic is the widespread use of abbreviations, both standard and nonstandard. Many of these are included to aid the reader of biochemical literature and to provide for the likelihood that some of the nonstandard abbreviations will become standard ones in the future. A third characteristic is the extensive use of synonymous expressions, frequently differing from each other only by minor variations. Since the synonymous nature of one expression to another may not always be apparent to the reader, principal synonymous expressions are included and

cross-referenced. A fourth characteristic is the widespread use of jargon, especially in the area of molecular biology. While some of these terms may subsequently drop out of usage, others will end up becoming part of the standard terminology. For this reason, a large number of such expressions that are currently used in biochemistry and molecular biology have been included in this dictionary.

This second edition differs from the first in two important aspects. One change involves the names of specific compounds and other substances. The number of such entries included in the dictionary has been substantially enlarged. At the same time, however, no attempt was made to be exhaustive in this respect.

The second change involves the scope of the definitions. While the concise nature of the definitions of the first edition has by and large been maintained, an effort has been made to provide some additional information when this was considered useful. Thus, many terms, both original and new ones, have been defined in a slightly expanded fashion. In some cases, even lengthier definitions were deemed desirable. This was the case, for example, for many of the physical-chemical techniques, hypotheses, theories, and models used in modern biochemistry, for which a brief definition would fail to convey the essence of the term to the reader and would fail to distinguish it clearly from other, related terms. In all cases, however, a comprehensive, encyclopedic treatment was purposely avoided.

I would like to thank Dr. Mary Conway, Margery Carazzone, and Diana Cisek, my editors at Wiley, for their cooperation and helpful suggestions; Michele McCarville, Connie Gray, and Linda Thayer for their typing of the manuscript; and my wife, Mabel, and my sons, Ilan and Oron, for their understanding and support during the prolonged and time-consuming work on this book.

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EXPLANATORY NOTES

Arrangement of Entries The entries are arranged in alphabetical order, letter by letter; thus "acidimetry" precedes "acid number," and "waterfall sequence" precedes "water hydrate model." Identical alphabetical listings are entered so that lowercase letters precede capital ones and subscripts precede superscripts.

Chemical prefixes, in either abbreviated or unabbreviated form, are disregarded in alphabetizing when they are used in the ordinary sense of denoting structure of organic compounds. These include ortho-, meta-, para-, alpha-, beta-, gamma-, delta-, *cis*-, *trans*-, *N*-, *O*-, and *S*-. Such prefixes are, however, included in alphabetizing when they form integral parts of entries and are used in ways other than for the indication of structure of organic compounds, as in "alpha helix," "beta configuration," and "N-terminal." The prefixes mono-, di-, tri-, tetra-, and poly-, which form integral parts of entries, are included in alphabetizing, as in "monoglyceride" and "tetrahydrofolic acid."

All numbers are disregarded in alphabetizing; these include numbers denoting chemical structure, as in "glucose-6-phosphate dehydrogenase" and "5-HT," and numbers used for other purposes, as in "factor IV" and "S-100 fraction."

The letters D and L, denoting configuration, are omitted from names of terms as entered and are usually omitted from the definitions themselves.

Form of Entries All entries are direct entries so that, for example, "first law of cancer biochemistry" is entered as such and not as "cancer biochemistry, first law of." The entries are generally in the singular, with the plural indicated only when considered necessary. When several parts of speech of a term are in use, the term is generally entered in the noun form, and other parts of speech are entered only to the extent deemed useful. The different meanings of a term are numbered, chemical formulas are generally omitted, and the spelling is American.

Cross References Four types of cross-references are used in this dictionary; they are indicated by the use of *see*, *aka*, *see also*, all in italics, and by the use of words in small capital letters. The word *see* is used either in a directive sense, as in "coat—*see* spore coat; viral coat" and "hereditary code—*see* genetic code," or to indicate that the term is defined within the definition of another, separately entered term, as

in " E_0' —*see* standard electrode potential" and "MIH—*see* melanocyte-stimulating hormone regulatory hormone." The abbreviation *aka* (also known as) is used at the end of a definition to indicate expressions that are synonymous to the entry; principal synonymous expressions are entered separately in the text. The phrase *see also* is used at the end of a definition where it is considered useful to point out to the reader comparable, contrasting, or other kinds of related entries. Small capital letters are used to indicate an expression that is synonymous to the entry and that is defined in its alphabetical place in the book. Thus, the definition of the entry "amphiphilic" by the word "AMPHIPHATIC," and the definition of the entry "pentose oxidation cycle" by the term "HEXOSE MONOPHOSPHATE SHUNT" indicate that the terms in small capital letters are expressions that are synonymous to the entries and that are themselves defined in their appropriate alphabetical places in the text.

Abbreviations and Symbols The following standard abbreviations and symbols are used in this dictionary:

A	ampere
Å	angstrom unit
abbr	abbreviation
adj	adjective
adv	adverb
aka	also known as
atm	atmosphere
°C	degree Celsius
cal	calorie
cc	cubic centimeter
cd	candela
cm	centimeter
cps	cycles per second
deg	degree
dm	decimeter
e.g.	for example
esu	electrostatic unit
g	gram
i.e.	that is
J	joule
kcal	kilocalorie
kg	kilogram
L	liter
lb	pound
lm	lumen

m	meter
mg	milligram
min	minute
mL	milliliter
mm	millimeter
mol	mole
MW	molecular weight
n	noun
nm	nanometer
pl	plural
rpm	revolutions per minute
s	second
sing	singular
sym	symbol
v	verb
var sp	variant spelling
%	percent
μ	micro
Ω	ohm

Abbreviations such as “DNA,” “E. coli,” and “mRNA” are used in the text of definitions only if the abbreviations themselves are defined at their appropriate places in the dictionary. Undefined abbreviations are not used in this book.

Various letters of the Greek alphabet are also

used in this dictionary. For completeness, the entire Greek alphabet is listed below:

Capital	Lowercase	Name
Α	α	alpha
Β	β	beta
Γ	γ	gamma
Δ	δ, δ	delta
Ε	ε	epsilon
Ζ	ζ	zeta
Η	η	eta
Θ	θ, θ	theta
Ι	ι	iota
Κ	κ	kappa
Λ	λ	lambda
Μ	μ	mu
Ν	ν	nu
Ξ	ξ	xi
Ο	ο	omicron
Π	π	pi
Ρ	ρ	rho
Σ	σ, σ	sigma
Τ	τ	tau
Υ	υ	upsilon
Φ	φ	phi
Χ	χ	chi
Ψ	ψ	psi
Ω	ω	omega