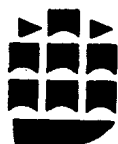


**LONGMAN  
DICTIONARY  
OF  
SCIENTIFIC USAGE**

# **LONGMAN DICTIONARY OF SCIENTIFIC USAGE**

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Longman Group Ltd.  
Harlow and London

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representatives*

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## About this dictionary

This is a reference book and practical aid for students studying science through English during their final years at secondary school and for those students using English in their first year at a University but whose education has been in a language other than English. The book will also be of use to those for whom English is not their first language, but are working in the scientific field and need access to English material. It will also be helpful to those teaching English to science students.

### The contents of the book

All the entries in the book are arranged into sets of terms that are closely related in meaning or subject area. This allows an entry to be compared or contrasted with related entries to make the meaning of a term clearer. There are two main sections in the book. The first comprises over 1300 basic terms commonly used in all branches of science, and which have different, and usually more precise, meanings in scientific contexts than they have in general speech. Included in this section are 180 prefixes, suffixes and general affixes of use in understanding many scientific terms. The second section defines over 8500 technical terms from the fields of biology, chemistry and physics. The entries contain other information, besides the definition, which will be of assistance in the usage of the term. The terms for biology, chemistry and physics are not divided into three separate sections; instead the sets of terms are presented according to an overall framework of scientific principles, as can be seen in the list of *Contents*.

The *Contents* shows the arrangement of terms in different subject areas. Each area is indicated by a two letter code, and within such an area or set, the terms are numbered consecutively. The set codes are placed at the top of each page showing the numbers of the terms covered. An alphabetical index at the back of the book lists all the terms and their place in the book, and indicates the subject field of the term where relevant.

### How to use this book

There are several ways of using this book.

#### 1 *Finding the meaning of a term when reading*

- a) Look for the term in the alphabetical index.
- b) If there is more than one reference, choose the correct field, either biology (Bio.), chemistry (Ch.), or physics (Ph.), and if necessary, the correct word class, e.g. noun (*n.*), verb (*v.*), or adjective (*adj.*). Note the set code, e.g. **natural** is coded **AB024**.
- c) Use the letters to find the set, and then the number to find the term's position in it.
- d) Read the definition and any examples.
- e) Look at the entries above and/or below in the set, as these will show differences in meaning useful in understanding the term.

#### 2 *Using a term when writing*

- a) Find the term, as explained above.
- b) Study the use of the term in the examples.

- c) Note any collocations and information about how the term should be used.

### 3 Searching for an unknown term when writing

This is best shown by example. Suppose the term **cluster** for a group of flowers on a stalk is known, but a term is needed for a group of flowers growing thickly on a particular piece of ground.

- Look for the term **cluster** in the alphabetical index.
- Find the term from the set code.
- By reading the definition of *cluster* and the definitions of related terms, it can be seen that **clump**, just below *cluster* in the set, is the correct term to use.

### 4 Revising the terms of a particular topic

- Select the subject area either from the list of *Contents*, or by selecting key terms from the alphabetical index.
- Find the relevant part of the dictionary and study the terms. This will, in many cases, provide a revision, or summary, of the topic.

### The definition

Each definition gives as much information as possible about the meaning and behaviour of the term. The definition itself is usually supplemented by typical examples of the term in context. Many definitions also carry examples of the term's collocation, that is the combination or phrase in which the term most frequently appears. Related forms of the headword (see Appendix 1) are shown when they are used in scientific contexts. If a related form is defined elsewhere in the dictionary it appears in small capital letters.

### References

Other terms that add to the reader's understanding of the definition are shown at the end of the entry. These references are marked with arrows to indicate their position in the dictionary. A downward pointing arrow (↓) indicates that the term is defined later in the same section of a set; an upward pointing arrow (↑) indicates that the term is defined earlier in the set. An arrow pointing sideways (→) is a cross-reference to a term in a different section of the set, or a member of another set; in either case the term must be located by means of the alphabetical index.

Many references are marked to show they have a meaning that stands in a particular relation to the term; for example, it may be opposite, or be very similar, in meaning. The following abbreviations are used to show these relationships (see also Appendix 2).

Ag	<i>gradable antonym</i>	(as in opposite terms such as <i>high</i> and <i>low</i> between which there is a continuous gradation of change)
An	<i>non-gradable antonym</i>	(as in opposite terms such as <i>plastic</i> and <i>elastic</i> between which there is a discontinuity in the change)
Cm	<i>complementary term</i>	(as when two terms cannot function independently of each other, such as <i>lock</i> and <i>key</i> , <i>male</i> and <i>female</i> )

## About this dictionary

Cn	<i>converse term</i>	(as in two terms between which there is a reference point, such as <i>above</i> and <i>below</i> )
Cs	<i>consequent term</i>	(as when one term follows on from another, as <i>solution</i> follows on from <i>solvation</i> )
H	<i>hyponym</i>	(a term whose meaning is included in the meaning of another term, as the meanings of <i>red</i> , <i>blue</i> and <i>green</i> are included in the term <i>coloured</i> )
I	<i>incompatible term</i>	(a term that involves the complete denial of its opposite, for example, a <i>perfect vacuum</i> is incompatible with <i>matter</i> )
P	<i>polar term</i>	(a term that cannot exist independently of another term; for example, the <i>north pole</i> and the <i>south pole</i> of a magnet are polar terms)
Sn	<i>cognate term</i>	(as when terms have some element of meaning in common, such as <i>ejection</i> and <i>exudation</i> )

### Sample entry

*book position code, headword  
and word class (part of speech)  
definition*

**AB025 natural** (*adj.*)

Describes substances existing in nature, substances produced by nature, or processes taking place without human action,

*examples of the term in context*

*e.g. a* natural gas which exists in pockets in the earth; *b* natural science is all sciences concerned with the physical world; *c* natural frequency is the frequency of vibration of a body when it is not affected by outside sources; *d* natural radioactivity is the radioactivity from naturally occurring substances

*collocation*

□ *natural gas is a naturally occurring substance*

*related forms*

—**naturally** (*adv.*)

*references*

↓ ARTIFICIAL (I) · IMITATION · FREE · DISCRETE ·  
AVAILABLE<sup>2</sup> · MATERIAL<sup>2</sup> · COMPOSED OF · IMPURE  
↑ MATTER → SYNTHETIC

# Contents

## Basic Terms

Set Code

**AA** Space

**AB** Matter

**AC** Shape

**AD** Existence

**AE** Constitution

**AF** Movement

**AG** Change

**AH** Time

**AJ** Process

**AK** Knowledge

**AL** Word Analysis

**AM** Statement

**AN** Measurement

**AP** Relationship

**AQ** Experiment

## Scientific Terms

Set Code

**BA** Physical Properties

**BB** Chemical Technique

**BC** Classification of Matter

**BD** Chemical Nomenclature

**BE** General Macrostructure

**BF** Surface Phenomena

**BG** Crystal Structure

**BH** Polymers and Glasses

**CA** General Taxonomy

**CB** Plant Taxonomy

**CC** Animal Taxonomy

**CD** General Morphology

**CE** Plant Morphology

**CF** Animal Morphology

**CG** Anatomical Terms

**CH** Plant Anatomy

**CJ** Animal Anatomy

**CK** Skeletal Anatomy

**CL** Histology

**CM** Epithelial Tissue

**CN** Connective Tissue

**CP** Muscular Tissue

**CQ** Nervous Tissue

**CR** Blood Tissue

**CS** Plant Tissue

**CT** Cytology

**CU** Cell Division and Function

**DA** Chemical Bonds

**DB** Atomic Structure

**DC** Molecular Structure

**DD** Solutions

**DE** Colloids

**DF** Ionic Theory

**EA** Laws of Motion

**EB** Forces

**EC** Projectiles, Friction

**ED** Molecular Theory

**EE** Kinetic Theory

**EF** Chromatography

**EG** Conductance and  
Electrolysis

**FA** Growth

**FB** Movement

**FC** Locomotion

**FD** Sensitivity

**FE** Internal Environment

**FF** Excretion

**FG** Function

**FH** Soil Transpiration

**GA** Ecology

**GB** Agriculture

**HA** Irritability

**HB** Nervous System

**HC** Sight

**HD** Hearing

**HE** Sense Organs

**JA** Endocrinology

**JB** Immunity

**JC** Pathogenicity

**JD** Hygiene

**KA** Chemical Reactions

**KB** Chemical Equilibrium

**KC** Reaction Mechanism

**KD** Physical Equilibrium

**KE** Elasticity

**KF** Hydrostatics

**KG** Measurement, SI units

**LA** Thermal Expansion,  
Temperature

**LB** Transfer of Heat

**LC** Chemical Energy

**LD** Thermochemistry

## **Contents**

**MA** Metabolism  
**MB** Nutrition  
**MC** Photosynthesis  
**MD** Nutrients  
**ME** Mouth and Teeth  
**MF** Gut  
**MG** Digestion  
**MH** Diet  
**MJ** Respiration

**NA** Work  
**NB** Wave Motion  
**NC** Electromagnetic Waves  
**ND** Light  
**NE** Radiation  
**NF** Radioactivity  
**NG** Mass Spectroscopy  
**NH** Sound  
**NJ** Current Electricity  
**NK** Electromagnetism  
**NL** Electronics  
**NM** Radio  
**NN** Chemical Laws

**PA** Animal Vascular Systems  
**PB** Plant Vascular Systems

**QA** Energy  
**QB** Magnetism  
**QC** Electrostatics

**RA** Evolution

**SA** Reproduction  
**SB** Sexual Reproduction  
**SC** Asexual Reproduction  
**SD** Alternation of Generations  
**SE** Genital Organs  
**SF** Flowers  
**SG** Life Cycles  
**SH** General Embryology  
**SJ** Mammalian Embryology

**TA** Heredity  
**TB** Nucleic Functions  
**TC** Genes

**UA** Chemical Potential



# Appendices

1. Related forms
2. References and relationships of terms
3. Abbreviations
4. Prefixes for SI Units
5.
  - 1) SI Units
  - 2) Quantities, units and symbols
  - 3) Letters used as symbols for quantities
6. Important values, constants, and standards
7. Common alloys
8. Table of chemical elements
9. Ionization energies of selected elements
10. Standard electrode and redox potentials
11. The Greek alphabet
12. Naming chemical compounds

## Appendix 1

### Related forms

Related forms of terms are obtained by affixation. In section **AL** (Word Analysis) the affixes especially used for scientific terms have been described. Terms which are formed by affixation are also called derivatives. The affixes described below are some of those occurring in general speech which are useful for scientific terms. These affixes do not cover the full range of the English language as some have been omitted because they are unimportant as far as scientific terms are concerned. For those interested, a fuller statement of affixation in the English language is given in *A Grammar of Contemporary English* (R. Quirk, S. Greenbaum, G. Leech, and J. Svartvik, Longman, 1972)

#### *Examples of derivation*

fraction (noun) → fraction-ate (verb) → fraction-at-ing (adjective)  
                  ↓                                  ↓  
fraction-al (adjective) fraction-at-ion (noun)

#### *Examples of related forms*

The most important derivative for scientific terms is 'fractionate', hence the related forms are: fraction, fractional, fractionation, fractionating. In the entry for **fractionate** (BB044) the related forms are shown in ***bold italics*** when the term is not described elsewhere and in **SMALL CAPITALS** when the term is described in another entry.

## Prefixes

### Negative Prefixes

PREFIX	MEANING	ADDED TO	EXAMPLE	COMMENT
<b>un-</b>	'the opposite of' 'not'	adjectives -ed or -ing participles	stable → unstable combined → uncombined saturated → unsaturated	with gradable adjectives
<b>non-</b>	'not'	adjectives  nouns	polar → nonpolar  metal → non-metal	with non-gradable adjectives
<b>im-</b>	as for un-	adjectives	soluble → insoluble miscible → immiscible reversible → irreversible	note change to im- before m/b/p, to il- before l, and ir- before r
<b>dis-</b>	as for un-	adjectives  verbs  abstract nouns	charged → discharged charge → discharge continuity → discontinuity	note borrowed forms, e.g. associate dissociate
<b>a-</b>	'lacking in' 'lack of'	adjectives  nouns	sexual → asexual symmetry → asymmetry	

### Prefixes which Reverse the State or Process

PREFIX	MEANING	ADDED TO	EXAMPLE	COMMENT
<b>de-</b>	'to reverse the action' 'to remove'	verbs  abstract nouns derived from verbs	hydrate → dehydrate activation → deactivation	
<b>dis-</b>	similar to de-	verb, hence participles  noun	connect → disconnect connected → disconnected connecting → disconnecting	

## Other Prefixes

PREFIX	MEANING	ADDED TO	EXAMPLE	COMMENT
<b>pseudo-</b>	a) 'false'  b) 'has the appearance of the object, but is not truly the same' c) 'like, or isomeric with'	a) nouns  b) adjectives  c) word segments	cilium → pseudocilium podium → pseudopodium septate → pseudoseptate  -carp → pseudocarp acid → pseudo-acid	Note: some terms use a hyphen, e.g. anti-proton
<b>anti-</b>	a) 'opposite in position or direction'  b) 'opposite in effect' c) 'acting against'	a) nouns  b) adjectives c) adjectives	peristalsis → antiperistalsis catalyst → anticytalyt biotic → antibiotic petalous → antipetalous	
<b>inter-</b>	a) 'between, among'  b) 'from one to another'	a) nouns b) adjectives c) verbs	breeding → interbreeding costal → intercostal change → interchange connect → interconnect	

## Suffixes

SUFFIX	MEANING	ADDED TO	EXAMPLE	COMMENT
<b>-er, -or</b>	VERB → NOUN 'agential'	mainly dynamic verbs → nouns	flex → flexor plasticize → plasticizer	verbs in -fy and -ze
<b>-ation</b>	'state' → 'action'	abstract nouns	crystallize → crystallization	
<b>-ness</b>	ADJECTIVE → NOUN 'state or quality'	adjective → abstract noun	brittle → brittleness	often added to adjectives in -able, -ible, -al, -ic
<b>-ity</b>	'state or quality'	adjective → abstract noun	malleable → malleability	

## Prefixes

SUFFIX	MEANING	ADDED TO	EXAMPLE	COMMENT
<b>-ify</b>	VERB FORMING 'causative'	noun/ adjective → verbs (v.t.)	acid → acidify	Note: many borrowed words change the stem, e.g. liquid → liquefy
<b>-ize</b>	'causative'	noun → verb (v.t.)	colour → decolourize platinum → platinize carbon → carbonize crystal → crystallize	
<b>-ary</b>	NOUN → ADJECTIVE 'producing' 'connected with'	noun → adjective	saliva → salivary	
<b>-able</b>	SOME OTHER ADJECTIVE FORMING SUFFIXES 'able to be' 'worthy of being' 'ought to be'	transitive verbs → adjectives	reverse → reversible vary → variable	many borrowed words, e.g. edible mutable
<b>-ly</b>	ADVERB FORMING SUFFIXES 'in a manner'	adjective → adverb of manner	explosive → explosively	

In the examples given it is usually clear that the affix has been added to a word already known. There are some suffixes which appear quite often but the original word (underlying form) is less easily identified.

*Explosives* and *explosion* obviously have a connection: *-ive* occurs quite often and so does *-ion*. Both the two words have *explos-*. This is not a word in English now. In meaning *explode* seems very close. This change, *explode* to *explosion*, took place before the word was borrowed.

In scientific English there are many words like this, borrowed long ago from Latin or Greek, already changed in their original languages: *-al*, *-ic*, and *-ous* (*-ious*, *-eous*) are examples of endings. To all of these *-ity* can be added.

cause – causal – causality

(electr) – electric – electricity

curio – curious – curiosity

*-al*, *-ic*, *-ive* form gradable adjectives

*-ous* forms non-gradable adjectives

See also Section **AL** in the Basic Terms.

## Appendix 2

### References and relationships of terms

1. Many references are marked to show that they have a meaning that stands in a particular relation to the defined term. The following abbreviations are used to show these relations.

- Ag** *Gradable antonyms* as in opposite terms, such as *high* and *low*, between which there is a continuous change. The use of either of these terms is subjectively assessed by the observer. For example, if observer A is higher than observer B, then an object between them is low to observer A and high to observer B. Other examples of gradable antonyms include: *hot* and *cold*; *accurate* and *inaccurate*; *elementary* and *advanced*.
- An** *Non-gradable antonyms* as in opposite terms, such as *elastic* and *plastic*, between which the change is marked by a discontinuity. The use of these terms is assessed objectively and is independent of the observer. For example, a material can be either elastic or plastic and empirical observation will determine which it is, as in the case of a copper wire which is elastic under stress up to a certain limit (marking the discontinuity) and then becomes plastic when the elastic limit is exceeded.
- Cn** *Converse terms* such as *above* and *below* which imply there is a reference point between the two states to which the terms refer, e.g. *above* and *below the melting point of ice*, in which the melting point of ice is the reference point between the two states of water.
- I** *Incompatible terms* such as *matter* and *vacuum*, between which no change is possible, and the possibility of one denies the possibility of the other for whatever is under discussion. For example, *crystalline* and *amorphous* are incompatible, as a crystalline substance such as sodium chloride cannot be amorphous, and the existence of the crystalline substance denies the possibility of there being amorphous sodium chloride.
- Cm** *Complementary terms* such as *lock* and *key*, which cannot function independently of each other. They can exist separately from each other, but must be together in order to function.
- P** *Polar terms* such as *north* and *south*, when describing the poles of a magnet, which cannot exist independently of each other. For example, *anode* and *cathode* are polar terms, as one cannot exist without the other in an experiment on electric current.
- Cs** *Consequent terms* such as *stress* and *strain*, which imply that in a process one condition is the consequence of the other. For example, when a *stress* is applied to a wire, the wire experiences a *strain*, and the strain is the consequence of the stress. Note that stress is not the consequent of strain.
- H** *Hyponyms* such as *blue* and *coloured*, in which the meaning of one term is included in the meaning of the other. For example, a *coloured* object can be red, *blue*, green or any other colour. *Blue* is a hyponym of *coloured* as its meaning is included in the meaning of coloured. Note that coloured is not a hyponym of blue.

## Appendix 2

**Sn** *Cognate terms* such as *replace* and *exchange*, which have some element of meaning in common. More than two terms can show a cognate relation, e.g. *improve*, *enhance*, *assist*, *aid*, *advance*, all have an element in common of causing a process to function better, but they differ in the manner by which the process becomes better.

2. The references with arrows pointing upwards (↑) and downwards (↓) belong to the same section of a set and hence these terms will generally show some form of cognate relation, although other relations are not excluded. The cross-references with an arrow pointing across (→) indicate the term is in another section or another set, but a knowledge of its meaning is useful in further clarifying the term which is defined.

## Abbreviations

### *Abbreviations used in the index and in the definitions*

- (Bio.) indicates the term is used in biology, chemistry, or physics.  
 (Ch.)  
 (Ph.)  
*Note:* The same term may have different meanings in different subjects, *e.g.* 'nucleus' can have different meanings, in biology, physics, and chemistry. When a headword appears in more than one place in the dictionary, it is numbered, *e.g.*, **nucleus<sup>1</sup>**, **nucleus<sup>2</sup>**, etc. If no label is given for any of the three sciences, then the term is used generally.
- (G.S.) abbreviation for 'General Speech'; it indicates the use of the term in written Standard English. If no (G.S.) definition of the term is given, its meaning can be found in a standard word list.
- (*n.*) a noun, noun phrase, or noun group, *e.g.* *thermodynamics* is a noun; *second law of thermodynamics* is a noun phrase; *leaf movement* is a noun group.
- (*pl.*) the plural of a noun when it does not follow the general rules, *e.g.* **stoma** (*n., pl. stomata*).
- (*n.pl.*) a noun which occurs in the plural, *e.g.* **thermodynamics**.
- (*adj.*) an adjective or a part of a verb used as an adjective, *e.g.* *regular* (*adj.*); *fractionating* (*adj.*) as in *fractionating column*; *varied* (*adj.*) as in *varied p.d.*
- (*v.t., i.*) a verb which can be used transitively or intransitively.
- (*v.i.*) a verb with an intransitive use.
- (*v.t.*) a verb with a transitive use.
- (*adv.*) an adverb.
- (*pre.*) indicates a group of letters which form a prefix.
- (*suff.*) indicates a group of letters which form a suffix.
- (*abbr.*) indicates an abbreviation.

### *Common abbreviations used in science*

abs.	absolute	d.	decomposed
a.c.	alternating current	d.c.	direct current
anhyd.	anhydrous	decomp.	decomposition
a.p.	atmospheric pressure	dil.	dilute
approx.	approximately	dist.	distilled
aq.	aqueous	e.g.	( <i>exempli gratia</i> ) for example
b.p.	boiling point	e.m.f.	electromotive force
c.g.	centre of gravity	eqn.	equation
coeff.	coefficient	expt.	experiment
conc.	concentrated	fig.	figure (diagram)
concn.	concentration	f.p.	freezing point
const.	constant	f.s.d.	full-scale deflection
crit.	critical	h.	hour
cryst.	crystalline		

### Appendix 3

hyd.	hydrated	r.m.m.	relative molecular mass
i.e.	( <i>id est</i> ) that is	r.m.s.	root mean square
insol.	insoluble	sol.	soluble
i.r.	infra-red	soln.	solution
liq.	liquid	sp.	specific
M.A.	mechanical advantage	sq.	square
max.	maximum	s.t.p.	standard temperature and pressure
min.	minimum	temp.	temperature
m.p.	melting point	u.v.	ultra-violet
p.d.	potential difference	vac.	vacuum
ppt.	precipitate	v.d.	vapour density
r.a.m.	relative atomic mass	V.R.	velocity ratio
r.d.	relative density	wt.	weight
r.h.	relative humidity		



## Appendix 4

### Prefixes for SI units

MULTIPLE	PREFIX	SYMBOL
$10^{12}$	tera	T
$10^9$	giga	G
$10^6$	mega	M
$10^3$	kilo	k
$10^{-3}$	milli	m
$10^{-6}$	micro	$\mu$
$10^{-9}$	nano	n
$10^{-12}$	pico	p