

Chambers Dictionary of Science and Technology

General Editor
John Lackie

Chambers

CHAMBERS

An imprint of Chambers Harrap Publishers Ltd
7 Hopetoun Crescent
Edinburgh
EH7 4AY

This edition first published by Chambers Harrap Publishers Ltd 2007

© Chambers Harrap Publishers Ltd 2007

Previous edition published in 1999. Previously published in 1995 as *Larousse Dictionary of Science and Technology*. First published as *Chambers's Technical Dictionary* in 1940 by W&R Chambers Ltd (revised 1958, 1971, 1974 and 1984).

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted by any means, electronic, mechanical, photocopying or otherwise, without the prior permission of the publisher.

A CIP catalogue record for this book is available from the British Library.

ISBN-13: 978 0550 100719

Text design by Ken Wilson
Typeset by Macmillan India Ltd
Printed in Great Britain by Clays Ltd, St Ives plc

- SIGMET message** (*EnvSci*) A warning issued by an aviation meteorological watch and forecast office of the occurrence or expected occurrence of one or more meteorological hazards to aircraft including thunderstorms, severe CLEAR AIR TURBULENCE, marked LEE WAVES and severe icing.
- sigmoid curve** (*Radiol*) An S-shaped curve which is often obtained in dose-effect curves in radiobiological studies.
- sigmoidectomy** (*Med*) Excision of part of the sigmoid flexure of the colon.
- sigmoid flexure** (*BioSci*) An S-bend.
- sigmoidoscope** (*Med*) An endoscope for viewing the mucous membrane of the rectum and pelvic colon.
- sigmoidostomy** (*Med*) The surgical formation of an opening (artificial anus) in the sigmoid flexure of the colon.
- sign** (*MathSci*) Of a number or expression: either of the properties POSITIVE (+) and NEGATIVE (-).
- sign** (*Med*) Any objective evidence of disease or bodily disorder, as opposed to a SYMPTOM, which is a subjective complaint of a patient.
- signal** (*ICT*) General term referring to a conveyor of information, eg an audio waveform, a video waveform, series of pulses in a computer. Colloq, the message itself. In radio, the signal modulates a carrier, and is recovered during reception by demodulation.
- signal** (*Surv*) A device, such as a ranging rod, heliostat, etc, used to mark a survey station.
- signal code** (*ICT*) In voice-frequency signalling, the plan for representing each of the required signalling functions as a voice-frequency signal.
- signal component** (*ICT*) That part of a signal which continues uniform in character throughout its duration. In a multicomponent signal with spaces between current pulses a space may be regarded as a signal component.
- signal distortion** (*Phys*) Modification of the information content of a signal, sometimes irreversibly; eg the suppression or introduction of HARMONICS.
- signal element** (*ICT*) The portion of a signal occupying the smallest interval of the signal code.
- signal frequency shift** (*ICT*) The bandwidth between white and black signal levels in frequency-modulation facsimile transmission systems.
- signal generator** (*ICT*) Oscillator designed to provide known voltages, typically from 1 to less than 1 μ V, over a range of frequencies. Used for testing or ascertaining performance of radio-receiving equipment. It may be amplitude-, frequency- or pulse-modulated.
- signal level** (*ICT*) The difference between the level of a signal at a point in a transmission system and the level of the arbitrarily specified reference signal.
- signalling system** (*ICT*) The means by which the messages needed to set up and control calls, as distinct from the calls themselves, are conveyed across a network. Signalling may take place over the user links (as with the signals sent by a telephone keypad) or over dedicated data channels. See COMMON CHANNEL SIGNALLING.
- signal output current** (*Electronics*) The absolute difference between the output current and the dark current of a phototube or a camera tube.
- signal peptides** (*BioSci*) Short N-terminal peptide sequences of newly synthesized membrane proteins which direct the protein towards the appropriate membrane, facilitate its transfer across it and are usually deleted during the subsequent maturation of the protein. Also *leader peptides*.
- signal recognition particle** (*BioSci*) A complex of proteins and RNA, found in the cytoplasm of cells, that assists the translocation of proteins across the membrane of the endoplasmic reticulum.
- signal-response coupling** (*BioSci*) See SIGNAL TRANSDUCTION.
- signal shaping** (*ICT*) Use of specially designed electrical network to correct distortion produced during transmission or propagation of signals.
- signal-to-cross-talk ratio** (*ICT*) In line telephony, the ratio of the test level in the disturbed circuit to the level of the cross-talk at the same point which is caused by the disturbing circuit operating at the test level.
- signal-to-noise ratio** (*Acous*) The ratio of a wanted signal to that of unwanted random (eg thermal) noise, usually expressed in decibels. Abbrevs SNR, S/N ratio.
- signal transduction** (*BioSci*) The cascade of processes by which a signal at the outer surface of a cell (eg hormone, neurotransmitter) interacts with a cell surface receptor and causes a response to take place within the cell, typically by stimulating an increase in a SECOND MESSENGER such as calcium ions or cyclic AMP.
- signal windings** (*ElecEng*) US term for CONTROL TURNS (or windings) of a saturable reactor.
- sign and magnitude** (*ICT*) A method of representing numbers in a binary word by coding the sign of the number in a SIGN BIT and the magnitude of the number in the remaining bits. Also *sign and modulus*.
- signature** (*Print*) See SECTION.
- signature mark** (*Print*) A number or letter of the alphabet placed at the tail on the first page of a section as a guide to the binder in GATHERING.
- sign bit** (*ICT*) Single bit, used to indicate the sign of a number, usually 0 for positive, 1 for negative.
- signed minor** (*MathSci*) See COFACTOR.
- significance** (*MathSci*) A threshold value of probability at or below which the results of a statistical investigation are held to justify rejecting a particular hypothesis.
- significant figures** (*MathSci*) Of a number: those digits which make a contribution to its value, from the leftmost non-zero digit to the rightmost non-zero digit; eg in the number 00.1230, the first two zeros are insignificant and the digits 1,2,3 are significant. The last zero may be significant, indicating that the number is accurate to four places of decimals, but this convention is not universal. Also *significant digits*. See also ROUNDING OFF.
- sign stimulus** (*Psych*) Part of a complex stimulus configuration which is relevant to a particular response and evokes the strongest response (eg the red breast of the robin).
- Sikes hydrometer** (*Chem*) A hydrometer used for determining the strengths of mixtures of alcohol and water.
- silage** (*Agri*) High-moisture-content FORAGE, commonly from grasses, fermented in storage for subsequent feeding to ruminant livestock during the winter. Also *ensilage*, the process of making such food.
- silal** (*Eng*) High-silicon (6%) cast-iron suitable for chemical plant and heat-resistant applications.
- silanes** (*Chem*) A term given to the silicon hydrides: silane, SiH₄, disilane H₂Si-SiH₃, trisilane, H₃Si(SiH₂)SiH₄, etc. Cf METHANE. Silane and chlorosilanes are used in chemical vapour deposition processes for silicon and in silicon dioxide deposition in semiconductor technology.
- Silastic** (*Plastics*) TN for a range of silicone rubbers. Noted for very good heat resistance and a wide temperature range of application. Excellent chemical resistance and electrical properties.
- sildenafil** (*Pharmacol*) Any of several compounds, esp sildenafil citrate (TN Viagra), that increase blood flow to the penis, used in treating male impotence.
- silencer** (*Autos*) An expansion chamber fitted to the exhaust pipe of an internal-combustion engine to dampen the noise of combustion. US *muffler*.
- silent mutation** (*BioSci*) Mutations that have no effect on phenotype because they do not affect the activity of the protein product of the gene, usually because of codon ambiguity.
- silent period** (*ICT*) Stated period within each hour during which all marine transmissions must close down and listen on the international distress frequency of 500 kHz.
- silesia** (*Textiles*) A smooth-faced, cotton lining fabric for garments, originally a plain weave but now a twill.
- Silesian** (*Geol*) The Upper Carboniferous of W Europe. See PALAEOZOIC.

Trace element analysis	1224
Transmissible spongiform encephalopathy	1231
Troposphere	1242
Twinned crystals	1250
Tyre technology	1252
Uranium isotope enrichment	1262
Vertebrate evolution	1277
Vitamins	1285
Wood - structure and properties	1306

Subject Categories

(Abbreviations are shown in brackets)

Acoustics (<i>Acous</i>)	Information and Communications Technology (<i>ICT</i>)
Aeronautics (<i>Aero</i>)	Mathematical Sciences (<i>MathSci</i>)
Agriculture (<i>Agri</i>)	Medicine (<i>Med</i>)
Architecture (<i>Arch</i>)	Mineral Extraction (<i>MinExt</i>)
Astronomy (<i>Astron</i>)	Mineralogy (<i>Min</i>)
Automobiles (<i>Autos</i>)	Nuclear Engineering (<i>NucEng</i>)
Bioscience (<i>BioSci</i>)	Paper (<i>Paper</i>)
Building (<i>Build</i>)	Pharmacology (<i>Pharmacol</i>)
Chemical Engineering (<i>ChemEng</i>)	Physics (<i>Phys</i>)
Chemistry (<i>Chem</i>)	Plastics (<i>Plastics</i>)
Civil Engineering (<i>CivEng</i>)	Powder Technology (<i>PowderTech</i>)
Crystallography (<i>Crystal</i>)	Printing (<i>Print</i>)
Electrical Engineering (<i>ElecEng</i>)	Psychology (<i>Psych</i>)
Electronics (<i>Electronics</i>)	Radar (<i>Radar</i>)
Engineering (<i>Eng</i>)	Radiology (<i>Radiol</i>)
Environmental Sciences (<i>EnvSci</i>)	Ships (<i>Ships</i>)
Food Science (<i>FoodSci</i>)	Space (<i>Space</i>)
Forestry (<i>For</i>)	Surveying (<i>Surv</i>)
General (<i>Genrl</i>)	Textiles (<i>Textiles</i>)
Geology (<i>Geol</i>)	Veterinary Science (<i>Vet</i>)
Glass (<i>Glass</i>)	
Image Technology (<i>ImageTech</i>)	

vapours (emanations), which he believed to operate in palingenesis.

ichor (*Med*) A thin, watery discharge from a wound or a sore. Adj *ichorous*.

ichthy-, ichthyo- (*Genrl*) Prefixes from Gk *ichthys*, fish.

ichthyic (*BioSci*) Pertaining to, or resembling, fish.

ichthyo- (*Genrl*) See **ICHTHY-**.

ichthyopterygium (*BioSci*) A paddle-like fin, or limb, used for swimming, eg pectoral or pelvic fin of fish.

ichthyosis (*Med*) A disease characterized by dryness and roughness of the skin, resembling fish scales, due to lack of secretion of the sweat and the sebaceous glands. Also *xeroderma*, *xerodermia*.

ichthyosis (*Vet*) Hardening of the skin which develops cracks which become filled with dirt and thereby suppurate. Seen congenitally in calves, also over the elbows and hocks of dogs.

ICM (*Agri*) See **INTEGRATED CROP MANAGEMENT**.

icon (*ICT*) A small on-screen symbol used to represent a function of a program etc. By moving a pointer to the icon (often by using a **MOUSE**) the user selects the function by 'clicking' on it, ie by pressing a button on the mouse or on the keyboard. See fig. at **WINDOWS**. See **WIMP**.

iconic memory (*Psych*) A form of sensory memory; a transient visual trace that fades rapidly after removal of the stimulus. Cf **ECHOIC MEMORY**.

icosahedron (*MathSci*) A 20-faced **POLYHEDRON**. The faces of a regular *icosahedron* are identical equilateral triangles.

icositetrahedron (*Min*) A solid figure having 24 trapezoidal faces, and belonging to the cubic system. Exemplified by some garnets.

ICRH (*NucEng*) Abbrev for *ion cyclotron resonance heating*. See **CYCLOTRON RESONANCE HEATING**.

ICSH (*Med*) Abbrev for *interstitial cell stimulating hormone*. See **LUTEINIZING HORMONE**.

ICSI (*BioSci*) Abbrev for *intracytoplasmic sperm injection*, a method of *in vitro* fertilization.

ICT (*Genrl*) Abbrev for *information and communications technology*, used in this dictionary to cover computing and telecommunications matters. Sometimes *information and computing technology*.

icterus (*Med*) Adj *icteric*. See **JAUNDICE**.

ictus (*Med*) A stroke or sudden attack.

ICW (*ICT*) Abbrev for **INTERRUPTED CONTINUOUS WAVES**.

id (*Psych*) In the Freudian model, that part of the personality which contains primitive animalistic impulses such as sex, anger and hunger. The irrational, demanding part of the personality that operates according to the pleasure principle.

iddingsite (*Min*) An alteration product of olivine consisting of goethite, quartz, montmorillonite group clay materials, and chlorite.

IDE (*ICT*) Abbrev for **INTEGRATED DRIVE ELECTRONICS** and **INTEGRATED DEVELOPMENT ENVIRONMENT**.

ideal (*MathSci*) A subset of a **RING** which is a **SUBGROUP** with respect to addition and which contains all products of its elements with any element of the ring.

ideal crystal (*Crystal*) One in which there are no imperfections or alien atoms.

ideal gas (*Chem*) A gas with molecules of negligible size and exerting no intermolecular forces. Such a gas is a theoretical abstraction which would obey the ideal gas law under all conditions:

$$pV = nRT$$

where *p* = pressure, *V* = volume, *n* = number of moles, *R* = **GAS CONSTANT** and *T* = absolute temperature. The behaviour of real gases becomes increasingly close to that of an ideal gas as their pressure is reduced. Also *perfect gas*.

ideal self (*Psych*) Humanistic term representing the characteristics, behaviours, emotions and thoughts to which a person aspires.

ideal transducer (*ElecEng*) Any transducer which converts without loss all the power supplied to it.

ideal transformer (*ElecEng*) A hypothetical transformer corresponding to one with a coefficient of coupling of unity.

ideas of reference (*Psych*) A characteristic of some mental disorders, notably schizophrenia, in which the individual perceives irrelevant and independent environmental and social events as relating to him- or herself ('people are looking at me').

idempotent (*MathSci*) An element, *e*, of a set on which an operation * is defined, such that *e*e = e*. For the usual addition of real numbers, zero is the only idempotent; for the usual multiplication of real numbers, zero and one are the only idempotents. A **GROUP** has one and only one idempotent, namely its identity element. There is no restriction on the number of idempotents to be found in a semi-group.

identification (*Psych*) In psychoanalytic theory, the way in which an individual incorporates (introjects) the values, standards, sexual orientation and mannerisms of the same-sex parent, as part of the development of the **SUPEREGO**. It can also be used to describe the influence of any relevant and powerful figure for the internalization of external norms.

identification dimensions (*Ships*) See **REGISTERED DIMENSIONS**.

identifier (*ICT*) Name or label chosen by the programmer.

identity (*MathSci*) (1) See **EQUATION**. (2) An element, *e*, of a set on which an operation * is defined, such that, for all elements *x* in the set *S* we have *x*e = x = e*x*, eg in the set of real numbers, zero is an identity element with respect to addition, and one is an identity element with respect to multiplication. Also *neutral element*.

identity mapping (*MathSci*) The identity mapping, or identity function, on a set *S* is the mapping *i_s* from *S* onto *S* defined by *i_s(x) = x*, for all elements *x* in *S*.

idio- (*Genrl*) Prefix from Gk *idios*, peculiar, distinct.

idioblast (*BioSci*) A cell of clearly different properties to the others in the tissue, as a stone cell in pear fruit.

idioblast (*Geol*) A crystal which grew in metamorphic rock and is bounded by its own crystal faces. Adj *idioblastic*. Cf **IDIOMORPHIC**. See **PORPHYROBLASTIC**.

idioglossia (*Med*) The wrong use of consonants by a child, making speech unintelligible.

idiogram (*BioSci*) A diagram (or photomontage) of the chromosome complement of a cell, conventionally arranged to show the general morphology including relative sizes, positions of centromeres, etc. Also *karyogram*.

idiographic (*Psych*) Used to describe any research, system or philosophy that focuses on the individual and does not attempt to formulate general laws. See **NOMOTHETIC**.

idiomorphic (*Geol*) A term used for igneous rock minerals which are bounded by the crystal faces peculiar to the species. Cf **ALLOTRIOMORPHIC** (anhedral), **HYPIDIOMORPHIC** (subhedral).

idiopathy (*Med*) Any morbid condition arising spontaneously, having no known origin. Adj *idiopathic*.

idiosyncrasy (*Med*) Individual hypersensitivity to a drug or food but not explained by altered immunity.

idiot (*Med*) A term no longer used but it formerly described a person so defective in mind from birth as to be unable to protect him- or herself against ordinary physical dangers. Now defined as 'mentally severely handicapped'.

idiothermous (*BioSci*) See **WARM-BLOODED**.

idiotope (*BioSci*) Antigenic determinant on immunoglobulin molecules characteristic of the product of a single clone or a small minority of clones, and associated with or part of the antigen binding site.

idiot savant (*Psych*) A child who, despite generally diminished skills, shows astonishing proficiency in one isolated skill ('foolish wise one').

idiot tape (*Print*) A continuous unjustified tape, containing only signals for new paragraphs, which must be processed into a new justified tape before it can control a typesetting or filmsetting machine. See **COMPUTER TYPESETTING**.