


**McGRAW-HILL
DICTIONARY OF
SCIENTIFIC AND
TECHNICAL
TERMS**

**Sixth
Edition**

McGraw-Hill

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On the cover: Representation of a fullerene molecule with a noble gas atom trapped inside. At the Permian-Triassic sedimentary boundary the noble gases helium and argon have been found trapped inside fullerenes. They exhibit isotope ratios quite similar to those found in meteorites, suggesting that a fireball meteorite or asteroid exploded when it hit the Earth, causing major changes in the environment. (Image copyright © Dr. Luann Becker. Reproduced with permission.)

Over the six editions of the Dictionary, material has been drawn from the following references: G. M. Garrity et al., *Taxonomic Outline of the Prokaryotes*, Release 2, Springer-Verlag, January 2002; D. W. Linzey, *Vertebrate Biology*, McGraw-Hill, 2001; J. A. Pechenik, *Biology of the Invertebrates*, 4th ed., McGraw-Hill, 2000; U.S. Air Force *Glossary of Standardized Terms*, AF Manual 11-1, vol. 1, 1972; F. Casey, ed., *Compilation of Terms in Information Sciences Technology*, Federal Council for Science and Technology, 1970; *Communications-Electronics Terminology*, AF Manual 11-1, vol. 3, 1970; P. W. Thrush, comp. and ed., *A Dictionary of Mining, Mineral, and Related Terms*, Bureau of Mines, 1968; *A DOD Glossary of Mapping, Charting and Geodetic Terms*, Department of Defense, 1967; J. M. Gilliland, *Solar-Terrestrial Physics: A Glossary of Terms and Abbreviations*, Royal Aircraft Establishment Technical Report 67158, 1967; W. H. Allen, ed., *Dictionary of Technical Terms for Aerospace Use*, National Aeronautics and Space Administration, 1965; *Glossary of Stinfo Terminology*, Office of Aerospace Research, U.S. Air Force, 1963; *Naval Dictionary of Electronic, Technical, and Imperative Terms*, Bureau of Naval Personnel, 1962; R. E. Huschke, *Glossary of Meteorology*, American Meteorological Society, 1959; *ADP Glossary*, Department of the Navy, NAVSO P-3097; *Glossary of Air Traffic Control Terms*, Federal Aviation Agency; *A Glossary of Range Terminology, White Sands Missile Range, New Mexico*, National Bureau of Standards, AD 467-424; *Nuclear Terms: A Glossary*, 2d ed., Atomic Energy Commission.

**McGRAW-HILL DICTIONARY OF SCIENTIFIC AND TECHNICAL TERMS,
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[NUCLEO] The mean time required for a neutron arising from a fission to produce a new fission. { 'jen-ə'rā-shən ,tīm }

generative grammar [COMPUT SCI] A set of rules that describes the valid expressions in a formal language on the basis of a set of the parts of speech (formally called the set of metavariables or phrase names) and the alphabet or character set of the language. { 'jen-rəd-iv 'gram-ər }

generative nucleus [BOT] A haploid nucleus in a pollen grain that produces two sperm nuclei by mitosis. { 'jen-rəd-iv 'nū-klē-əs }

generator [COMPUT SCI] A program that produces specific programs as directed by input parameters. Also known as generating routine. [ELEC] A machine that converts mechanical energy into electrical energy; in its commonest form, a large number of conductors are mounted on an armature that is rotated in a magnetic field produced by field coils. Also known as dynamo; electric generator. [ELECTR] 1. A vacuum-tube oscillator or any other nonrotating device that generates an alternating voltage at a desired frequency when energized with direct-current power or low-frequency alternating-current power. 2. A circuit that generates a desired repetitive or nonrepetitive waveform, such as a pulse generator. [MATH] 1. One of the set of elements of an algebraic system such as a group, ring, or module which determine all other elements when all admissible operations are performed upon them. 2. See generatrix. { 'jen-ə,rəd-ər }

generator field control [ELEC] Method of regulating the output voltage of a generator by controlling the voltage which excites the field of the generator. { 'jen-ə,rəd-ər 'fēld kən,trol }

generator lock [ELECTR] Circuitry that synchronizes two video signals so that they can be mixed. Abbreviated genlock. { 'jen-ə,rəd-ər ,læk }

generator reactor [ELEC] A small inductor connected between power-plant generators and the rest of an electric power system in order to limit and localize the effects of voltage transients. { 'jen-ə,rəd-ər rē,ak-tər }

generator resistance [ELEC] The resistance of the current source in a network; usually much smaller than the load but taken into account in some network calculations. { 'jen-ə,rəd-ər ri,zis-təns }

generator set [ENG] The aggregate of one or more generators together with the equipment and plant for producing the energy that drives them. { 'jen-ə,rəd-ər ,set }

generatrix [MATH] The straight line generating a ruled surface. Also known as generator. { 'jen-ə,rā-triks }

gene redundancy [GEN] The presence of additional copies of a gene within a cell. { 'jēn ri'də:n-dən-sē }

gene regulatory protein [CELL MOL] The general name for a protein that controls gene expression via its ability to bind to specific deoxyribonucleic acid sequences during transcription. { 'jēn ,reg-yə-lə,tōr-ē 'prō,tēn }

generic [BIOL] Pertaining to or having the rank of a biological genus. [SCI TECH] 1. A term applied to or descriptive of an entire group or a class. 2. In general use, that which is nonproprietary. { jə'ner-ik }

gene scanning [CELL MOL] A method by which mutations are inserted at specific sites on a deoxyribonucleic acid (DNA) segment to determine those DNA sequences needed for gene activity. { 'jēn ,skan-ɪŋ }

gene sharing [GEN] The acquisition and maintenance of a second function for a gene without duplication and without loss of primary function. { 'jēn ,sher-ɪŋ }

genesis rocks [GEOL] Rocks that have retained their character from nearly 4.6×10^9 years ago, when planets were still coagulating out of the cloud of dust and gas referred to as the solar nebula; examples are meteorites and asteroids. { 'jen-ə-səs ,ræks }

gene splicing See recombinant technology. { 'jēn ,splɪs-ɪŋ }

gene substitution [GEN] The replacement of an allele with a mutant allele. { 'jēn ,səb-stə,tɪ-shən }

gene suppression [GEN] The development of a normal phenotype in a mutant individual or cell due to a second mutation either in the same gene or in a different gene. { 'jēn sə,presh-ən }

genet [VERT ZOO] The common name for nine species of small, arboreal African carnivores in the family Viverridae. { 'jen-ət }

gene targeting [GEN] Replacement, by genetic engineering

and homologous recombination, of a mutant (or wild-type) gene by a wild-type (or mutant) copy that may also contain a reporter gene. { 'jēn ,tār-gəd-ɪŋ }

gene therapy [GEN] An experimental technique in which a normal gene is inserted into an organism to correct a genetic defect. { 'jēn ,ther-ə-pē }

genetic algorithm [COMPUT SCI] A search procedure based on the mechanics of natural selection and genetics. Also known as evolutionary strategy. { jə,ned-ik 'al-gə,rɪθ-əm }

genetic block [GEN] The reduction in enzyme activity due to a gene mutation. { jə'ned-ik 'blæk }

genetic carrier [GEN] An individual who is heterozygous for a recessive gene that predisposes for a hereditary disease. { jə'ned-ik kar-ē-ər }

genetic code [CELL MOL] The genetic information in the nucleotide sequences in deoxyribonucleic acid represented by a four-letter alphabet that makes up a vocabulary of 64 three-nucleotide sequences, or codons; a sequence of such codons (averaging about 100 codons) constructs a message for a polypeptide chain. { jə'ned-ik 'kɒd }

genetic colonization [GEN] Natural introduction of genetic material into the deoxyribonucleic acid of a host cell; for example, transmission of a tumor-inducing plasmid into a plant cell by the bacterium *Agrobacterium tumefaciens*. { jə'ned-ik ,kæl-ə-nə'zā-shən }

genetic death [GEN] 1. Preferential elimination of genotypes that are carriers of alleles that reduce the adaptive value or fitness of those genotypes. 2. The death of an individual without reproducing. { jə'ned-ik 'deθ }

genetic differentiation [GEN] The accumulation of differences in allelic frequencies between completely or partially isolated populations due to evolutionary forces such as selection or genetic drift. { jə'ned-ik ,dɪf-ə'ren-che'ə-shən }

genetic distance [GEN] 1. A measure of the allelic substitutions per locus that have occurred during the separate evolution of two populations or species. 2. The distance between linked genes in terms of recombination frequency or map units. { jə'ned-ik 'dis-təns }

genetic drift [GEN] The random fluctuation of gene frequencies from generation to generation that occurs in small populations. { jə'ned-ik 'drɪft }

genetic engineering [GEN] The intentional production of new genes and alteration of genomes by the substitution or addition of new genetic material. Also known as biogenetics. { jə'ned-ik en-jə'nɪr-ɪŋ }

genetic equilibrium [GEN] In a population, the condition in which the frequencies of allelic genes are maintained at the same values from generation to generation. { jə'ned-ik ,ē-kwə'lib-rē-əm }

genetic facies [GEOL] An ancient deposit of rocks which have been formed by similar sedimentary processes. { jə'ned-ik 'fæ-shēz }

genetic fingerprinting [FOREN SCI] A forensic identification technique that enables virtually 100% discrimination between individuals from small samples of blood or semen, using probes for hypervariable minisatellite deoxyribonucleic acid. Also known as DNA fingerprinting. [CELL MOL] Identification of chemical entities in animal tissues as indicative of the presence of specific genes. { jə'ned-ik 'fɪŋ-gər,prɪnt-ɪŋ }

genetic homeostasis [GEN] The tendency of Mendelian populations to maintain a constant genetic composition. { jə'ned-ik ,hō-mē-ō'stā-səs }

genetic identity [GEN] A measure of the proportion of genes that are identical in two populations. { jə'ned-ik 'ɪden-əd-ē }

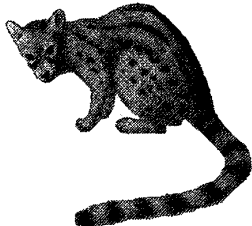
genetic induction [GEN] Gene activation by a molecule that inactivates a repressor protein and thereby activates transcription of one or more structural genes. [MOL BIO] Gene activation by a chemical inducer; results in transcription of structural genes. { jə'ned-ik ɪn'dʌk-shən }

genetic isolation [GEN] The absence of genetic exchange between populations or species as a result of geographic separation or of mechanisms that prevent reproduction. { jə'ned-ik ɪs-əl'ā-shən }

genetic load [GEN] The reduction in fitness of a diploid population due to new mutant genes and those already in the gene pool. { jə'ned-ik 'lɒd }

genetic map [GEN] A graphic presentation of the linear arrangement of genes on a chromosome; gene positions are

GENET

Spotted genet (*Genetta genetta*).

unipolar machine *See* homopolar generator. { 'yü-nə'pö-lər mə'shēn }

unipolar transistor [ELECTR] A transistor that utilizes charge carriers of only one polarity, such as a field-effect transistor. { 'yü-nə'pö-lər tran'zis-tər }

unipole [ELECTROMAG] A hypothetical antenna that radiates or receives signals equally well in all directions. Also known as isotropic antenna. { 'yü-nə,pöl }

uniporter [CELL MOL] A channel protein that transfers only one substrate at a time across the membrane. { 'yü-nə,pörd-ər }

unipotential cathode *See* indirectly heated cathode. { 'yü-nə-pə'ten-chəl 'kath,əd }

unipotential electrostatic lens [ELECTR] An electrostatic lens in which the focusing is produced by application of a single potential difference; in its simplest form it consists of three apertures of which the outer two are at a common potential, and the central aperture is at a different, generally lower, potential. { 'yü-nə-pə'ten-chəl 'lek-trə'stad-ik 'lens }

uniprocessor [COMPUT SCI] A computer that has a single central processing unit and works sequentially on only one program at a time. { 'yü-nə,prə'ses-ər }

unique-factorization domain [MATH] An integral domain in which every element that is neither a unit nor a prime has an expression as the product of a finite number of primes, and this expression is unique except for unit factors and the order of factors. Also known as factorial ring; unique-factorization ring. { 'yü'nēk ,fak-tə-rə'zā-sha dō,män }

unique-factorization ring *See* unique-factorization domain. { 'yü'nēk ,fak-tə-rə'zā-shən ,rɪŋ }

unique factorization theorem [MATH] A positive integer may be expressed in precisely one way as a product of prime numbers. { 'yü'nēk ,fak-tə-rə'zā-shən ,θir-əm }

unit [ENG] An assembly or device capable of independent operation, such as a radio receiver, cathode-ray oscilloscope, or computer subassembly that performs some inclusive operation or function. [MATH] An element of a ring with identity that has both a left inverse and a right inverse. [ORD] 1. Any military element whose structure is prescribed by competent authority, such as a table of organization and equipment; specifically, part of an organization. 2. A standard of basic quantity into which an item of supply is divided, issued, or used. [PHYS] A quantity adopted as a standard of measurement. { 'yü-nət }

unital left module [MATH] A left module over a ring with a unit element, 1, such that, for any element x of the module, $1 \cdot x = x$. { 'yü-nat-əl 'left 'mäj-əl }

unital module [MATH] A module over a ring with a unit element, 1, such that $1 \cdot x = x$ for any element x of the module. { 'yü-nət-əl 'mäj-əl } --

unit-area acoustical ohm *See* rayl. { 'yü-nət 'er-ē-ə 'kü-s-tə-kəl 'öm }

unitarity condition [PART PHYS] The condition that the scattering matrix for any process be unitary, as a result of the fact that the probability for the system to end in some final state must be unity. { 'yü-nə'tar-əd-ē kən,dish-ən }

unitary air conditioner [MECH ENG] A small self-contained electrical unit enclosing a motor-driven refrigeration compressor, evaporative cooling coil, air-cooled condenser, filters, fans, and controls. { 'yü-nə,ter-ē 'er kən,dish-ən-ər }

unitary decuplet [PART PHYS] A collection of 10 hadrons whose isospin and hypercharge values form a symmetrical pattern, and which are related by unitary symmetry operations. { 'yü-nə,ter-ē dē'kəp-lət }

unitary group [MATH] The group of unitary transformations on a k -dimensional complex vector space. Usually denoted $U(k)$. { 'yü-nə,ter-ē 'grüp }

unitary matrix [MATH] A matrix whose inverse is equal to the complex conjugate of its transpose. { 'yü-nə,ter-ē 'mä-triks }

unitary octet [PART PHYS] A collection of eight hadrons whose isospin and hypercharge values form a symmetrical pattern, and which are related by unitary symmetry operations. { 'yü-nə,ter-ē äk'tet }

unitary space [MATH] A finite-dimensional inner-product space over the field of complex numbers. { 'yü-nə,ter-ē 'spās }

unitary spin [PART PHYS] A quantum number associated

with SU_3 symmetry and which determines the SU_3 supermultiplet to which a particle belongs, such as singlet, octet, or decuplet. { 'yü-nə,ter-ē 'spin }

unitary symmetry [PART PHYS] An approximate internal symmetry law obeyed by the strong interactions of elementary particles; a system of particles has such a symmetry if all the particles can be described as compounds of a fundamental multiplet of particles, and if all physical properties of the system are unchanged by an arbitrary unitary transformation of this fundamental multiplet. { 'yü-nə,ter-ē 'sim-ə-trē }

unitary transformation [MATH] A linear transformation on a vector space which preserves inner products and norms; alternatively, a linear operator whose adjoint is equal to its inverse. { 'yü-nə,ter-ē ,tranz-fər'mā-shən }

unit assembly [IND ENG] Assemblage of machine parts which constitutes a complete auxiliary part of an end item, and which performs a specific auxiliary function, and which may be removed from the parent item without itself being disassembled. { 'yü-nət ə'sem-blē }

unit ball [MATH] The set of all points in euclidean n -space whose distance from the origin is at most 1. { 'yü-nət 'böl }

unit binormal [MATH] A unit vector in the same direction as the binormal to a point on a surface or space curve. { 'yü-nət bɪ'nɔr-məl }

unit cell [CRYSTAL] A parallelepiped which will fill all space under the action of translations which leave the crystal lattice unchanged. Also known as structure cell. [MIN ENG] In flotation, a single cell. { 'yü-nət 'sel }

unit charge *See* statcoulomb. { 'yü-nət 'chärj }

unit circle [MATH] The locus of points in the plane which are precisely one unit from the origin. { 'yü-nət 'sər-kəl }

unit complex number [MATH] A complex number whose absolute value is 1. { 'yü-nət ,käm,pleks 'nɒm-bər }

unit construction [BUILD] An assembly comprising two or more walls, plus floor and ceiling construction, ready for shipping to a building site. { 'yü-nət kən'strək-shən }

unit conversion factor *See* conversion factor. { 'yü-nət kən'vər-zhən ,fak-tər }

unit cost [IND ENG] Cost allocated to a specified unit of a product; computed as the cost over a period of time divided by the number of units produced. { 'yü-nət 'kɒst }

unit delay [ELECTR] A network whose output is equal to the input delayed by one unit of time. { 'yü-nət dɪ'la }

unit die [MET] A die block having more than one cavity insert and allowing several different castings to be made. { 'yü-nət 'di }

United States airways code [METEOROL] A synoptic code for communicating aviation weather observations. Also known as airways code. { 'yənɪd-əd 'stæts 'er,wəz ,kɒd }

United States standard dry seal thread [DES ENG] A modified pipe thread used for pressure-tight connections that are to be assembled without lubricant or sealer in refrigeration pipes, automotive and aircraft fuel-line fittings, and gas and chemical shells. { 'yənɪd-əd 'stæts 'stan-dərd 'dri'sel ,θred }

United States Survey foot [GEOD] The foot used by the U.S. Coast and Geodetic Survey in which 1 inch is equal to 2.540005 centimeters. { 'yütəs 'sər,və 'füt }

unitgmic [BOT] Referring to an ovule having a single integument. { 'yü-nə'teg-mik }

unit element [MATH] An element in a ring which acts as a multiplicative identity. { 'yü-nət 'el-ə-mənt }

uniterm [COMPUT SCI] A word, symbol, or number used as a description for retrieval of information from a collection; especially, such a description used in a coordinate indexing system. { 'yü-nə,tərm }

uniterm system [COMPUT SCI] An information retrieval system which uses uniterm cards; cards representing words of interest in a search are selected and compared visually; if identical members are found to appear on the uniterm card undergoing comparison, those numbers represent documents to be examined in connection with the search. { 'yü-nə,tərm ,sis-təm }

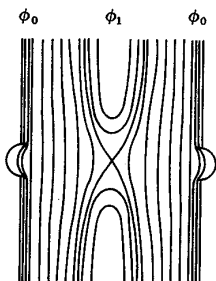
unit fraction [MATH] A common fraction whose numerator is unity. { 'yü-nət ,fræk-shən }

unit heater [MECH ENG] A heater consisting of a fan for circulating air over a heat-exchange surface, all enclosed in a common casing. { 'yü-nət 'hēd-ər }

unit impulse *See* delta function. { 'yü-nət 'im,pəls }

unitized body [ENG] An automotive body that has the body

UNIPOTENTIAL ELECTROSTATIC LENS



A unipotential electrostatic lens, a type of axially symmetric electrostatic lens. ϕ_0 = common potential for outer two apertures; ϕ_1 = lower potential for central aperture.