



Academic Press  
Dictionary  
of Science and  
Technology



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**Solenichthyes** *Vertebrate Zoology*. an alternate name for the suborder Syngnathoidae, which contains the pipefishes, sea horses, snipefishes, shrimpfishes, trumpetfishes, and flutemouths.

**solenium** *Invertebrate Zoology*. 1. see STOLON, def. 2. 2. a tube connecting adjacent polyps in some colonial anthozoans.

**solenocyte** *Invertebrate Zoology*. a type of elongated flame bulb having a single long flagellum.

**solenodon** *Vertebrate Zoology*. any member of the family Solenodontidae, primitive ratlike insectivorous mammals that are found in Cuba and Hispaniola.

**Solenodontidae** *Vertebrate Zoology*. a family of very rare, large ratlike insectivores of the mammalian group Lipotyphla having a long snout, short ears, a long scaly tail, hard fur, and forty teeth.

**Solenogastres** see APLACOPHORA.

**solenoid** [sol'i noid; sal'i noid] *Electromagnetism*. an electromagnetic coil wound in the shape of a hollow cylinder or spool, often containing a movable iron core that is pulled into the coil when current flows through the wire turns, thus allowing it to move other devices such as relays and circuit breakers. *Mechanical Engineering*. a switch or other device that is activated by such a coil, as in an automobile starting system. *Meteorology*. a tube formed in space by the intersection of surfaces of equal pressure and density.

**solenoidal** *Electromagnetism*. relating to or powered by a solenoid. *Mathematics*. a vector field  $F$  defined in a simply connected domain is said to be solenoidal if its divergence vanishes at every point of the domain. Also, SOURCE-FREE.

**solenoidal index** *Meteorology*. a mathematical expression of the difference between the mean virtual temperature from the ground to a known altitude aloft at 55° latitude and the mean virtual temperature for the corresponding layer averaged at 35° latitude.

**solenoid brake** *Mechanical Engineering*. an electromechanical braking device in which the brake toggle is operated by the plunger of a solenoid.

**solenoid model** *Genetics*. a model proposed to explain the supercoiled nature of chromatin, postulating that DNA is compacted and coiled around histone molecules to form nucleosomes of 30-nm diameter; common to most chromosomes.

**solenoid valve** *Mechanical Engineering*. a valve actuated by the magnetic field produced in a solenoid to control the flow of gas or fluid in a pipe.

**Solenopora** *Paleontology*. a genus of calcite-secreting algae in the extinct family Solenoporaceae; extant from the Cambrian to Cretaceous.

**Solenoporaceae** *Paleontology*. a family of calcareous red algae classified in the phylum or division Rhodophyta; they formed nodular masses of calcite consisting of tightly packed vertical tubes; extant in the Cambrian to Miocene.

**solepiece** *Civil Engineering*. 1. any horizontal member used to distribute the loads from one or more uprights. 2. a member that supports the foot of a raking shore. *Naval Architecture*. an attachment to the foot of a rudder that aligns with a false keel.

**sole plate** or **soleplate** *Building Engineering*. the lower surface of the body of a plane or plate upon which studding is erected. Also, SHOE, SOLE. *Mechanical Engineering*. 1. a flat piece of material that serves as a foundation for a machine. 2. a flat, thin piece of material upon which a bearing may be attached and sometimes adjusted. *Neurology*. an obsolete term for subneural apparatus of the neuromuscular junction.

**soleus** *Anatomy*. a muscle on the posterior surface of the tibia that plantar flexes the foot.

**solfatara** *Volcanology*. a volcanic vent from which only gases are emitted. (Named for the volcano Solfatara, near Naples, Italy; from the Italian word for "sulfur.")

**solfataric stage** *Volcanology*. the final stage of a volcanic eruption, during which only gases are emitted from the vent.

**sol-gel coating** *Materials Science*. a coating produced by the sol-gel process of glassmaking, in which glass is formed at low temperatures from suitable compounds by chemical polymerization in a liquid phase; a gel is formed from which glass may be derived by the successive elimination of interstitial liquid and the collapse of the resulting solid residue by sintering.

**sol-gel process** *Materials Science*. a processing technique in which a fibrous gel is drawn from a solution at near room temperature and converted into glass or ceramic fibers at several hundred degrees Celsius.

**soliciting** or **solicitation** *Zoology*. the movements and postures of a female animal that attract a male to her for copulation.

**solid** *Physics*. one of the three fundamental states of matter, along with liquids and gases. Of these three forms, a solid has the greatest tendency to resist forces that would alter its shape; thus its shape and volume are fixed and are not affected by the space available to it. In comparison with liquids and gases, solids have closely packed molecules; their normal condition is a crystalline structure. *Mathematics*. a closed and bounded subset of three-dimensional space having positive volume.

**solid angle** *Mathematics*. a measure on the space of rays emanating from a point in Euclidean 3-space; equal to the area of the intersection of the set of rays with the surface of the unit sphere centered at the point. The set of all rays emanating from a point has solid angle equal to  $4\pi$  steradians.

**solid coupling** *Mechanical Engineering*. a nonflexible connection between two shafts that forms a permanent joint designed to bear a full load of rotation or transmission.

**solid cutter** *Mechanical Devices*. the cutting part of a machine tool, made from a single piece of material.

**solid die** *Mechanical Devices*. an internally threaded, screw-cutting tool, constructed of a single piece of material.

**solid drilling** *Engineering*. a process used in diamond drilling, in which the entire face of an area is ground, and no core is extracted for sampling.

**solid electrolytes** *Materials Science*. materials that conduct electricity by ionic diffusion, including crystalline, vitreous, polymeric, or electrolyte-colloidal-particle composites; used as thin-membrane separators of two reactants, as in batteries.

**solid electrolytic capacitor** *Electricity*. a capacitor that uses a solid electrolyte for one plate.

**solid explosive** *Materials*. an explosive in the form of a powder, a granulated mass, or solid sticks.

**solid geometry** *Mathematics*. the geometric study of space figures such as polyhedra, cylinders, cones, and spheres, including the notions of similarity, congruence, and computation of area and volume.

**solid helium** *Physics*. a solid phase of helium that is only obtained with the application of about 25 atmospheres of external pressure while at a temperature near absolute zero.

**solidification** *Physics*. the transition of a liquid or a gas to the solid phase; the process of becoming solid.

**solidification inclusion** *Materials Science*. a defect in a metal casting resulting from the inclusions of generally nonmetallic materials, such as slag, that can affect the mechanical properties by acting as stress raisers.

**solidification shrinkage** *Metallurgy*. in casting, the shrinkage occurring during solidification.

**solidify** *Physics*. to undergo or cause to undergo solidification.

**solid injection system** *Mechanical Engineering*. a diesel-engine injection system in which a pump forces the fuel through a line and an atomizing nozzle into the combustion chamber.

**solid insulator** *Electricity*. any dielectric material with high mechanical strength that is used to separate conductors without allowing electric current to flow.

**solid laser** *Optics*. see SOLID-STATE LASER.

**solid-liquid equilibrium** *Physical Chemistry*. 1. the thermodynamic relationship between a solid and its melt when vapor pressure remains constant. 2. the thermodynamic relationship between the concentration of a solid and a solvent, other than the melt of that solid. Also, LIQUID-SOLID EQUILIBRIUM.

**solid logic technology** *Electronics*. a computer design technology that incorporates miniaturized modules, resulting in faster circuitry due to the reduced distances that electric current must travel.

**solid lubricant** *Materials*. a thin film of solid material interposed between two surfaces to reduce friction and wear under severe operating or environmental conditions; includes solid inorganic compounds such as graphite, solid organic compounds such as soaps and waxes, and metal surface coatings such as chemically deposited oxide films, metal films, and bonded coatings.

**solid moment of inertia** *Physics*. a quantity applicable to a solid having a definite volume; used to describe the rotational inertia of the solid about some specified axis.

**solid-phase sequencer** *Biotechnology*. a device used to determine the amino acid sequence in a protein; the sample is covalently attached to a solid-phase glass or styrene bead and packed in a micro-column prior to degradation.

**solid-phase welding** *Metallurgy*. any of several welding processes in which the heat of fusion is provided by the heat of the metal; the metal is not



**permanent fault** *Computer Programming*, a computer error that consistently occurs under certain conditions exist.

**permanent gas** *Chemistry*, a gas that cannot be condensed or liquefied by pressure alone. *Thermodynamics*, a gas that is at a temperature far above its critical temperature.

**permanent hardness** *Chemistry*, water hardness that cannot be removed by boiling; a property of water that contains sulfates or chlorides, as distinguished from the temporary hardness of water that contains bicarbonates.

**permanent ice foot** *Hydrology*, a narrow strip of ice attached to a polar coast that does not melt completely in summer.

**permanent magnet** *Electromagnetism*, a ferromagnetic substance that has been subjected to a magnetic field strong enough to cause the material to retain its own magnetization indefinitely.

**permanent-magnet focusing** *Electronics*, an adjusting of the electron beam in a television picture tube by the magnetic field produced by permanent magnets mounted around the neck of the tube.

**permanent-magnet generator** *Electricity*, a generator in which the magnetic field is created by permanent magnets.

**permanent-magnet loudspeaker** *Acoustical Engineering*, an inductive loudspeaker in which a steady-state magnetic field is produced by permanent magnets.

**permanent mold** *Metallurgy*, in casting, a term for a mold that is used more than once.

**permanent press** *Textiles*. **1.** the process of applying a synthetic finish to fabrics and garments in order to make them retain desired creases and to impart shape retention and crease resistance. **2.** a fabric produced by such a process. **3.** permanent-press. of or relating to this process. Also, DURABLE PRESS.

**permanent-press resin** *Organic Chemistry*, a thermosetting resin used to impart crease resistance to textiles and fibers.

**permanent set** *Mechanics*, the plastic deformation of a body that remains after the applied load is removed. Also, PLASTIC DEFORMATION.

**permanent-split capacitor motor** *Electricity*, a capacitor motor that operates with the starting capacitor and auxiliary winding closed or operative in the circuit. Also, CAPACITOR START-RUN MOTOR.

**permanent spring** see PERENNIAL SPRING.

**permanent storage** *Computer Technology*. **1.** storage that cannot be modified. Also, FIXED STORAGE, READ-ONLY STORAGE. **2.** storage, such as magnetic tapes and diskettes, that does not lose its contents in the event of a loss of power.

**permanent stream** see PERENNIAL STREAM.

**permanent tooth** *Anatomy*, any of the thirty-two adult teeth, including replacements for the deciduous teeth.

**permanent water** *Hydrology*, a water source that stays constant throughout the year.

**permanent wave** *Fluid Mechanics*, a wave in a fluid whose streamline pattern remains constant in time in a coordinate system that moves with the wave.

**permanganic acid** *Chemistry*,  $\text{HMnO}_4$ , an acid known only in solution.

**Permasyn motor** *Electricity*, a synchronous motor that provides an equivalent DC field as a result of permanent magnets embedded in its squirrel-cage motor.

**permatron** *Electronics*, a thermionic gas tube in which conduction is controlled by an external magnetic field.

**permeability** [per'mē ə bil'ə tē] *Fluid Mechanics*, the capability of a porous substance or membrane to allow a fluid to filter through it. *Agronomy*, the ease with which water, air, or plant roots penetrate or pass through a soil horizon. *Engineering*, the relative ability of a rock or soil to conduct magnetic lines of force. *Electromagnetism*, a factor that is characteristic of the magnetic properties of a substance; given by the ratio of the magnetic flux induction  $B$  to the magnetizing force  $H$ , and symbolized by  $m$ ; in most cases,  $B$  is parallel to  $H$  and  $m$  is a scalar quantity, otherwise  $m$  is a tensor.

**permeability alloy** see PERMALLOY.

**permeability coefficient** *Fluid Mechanics*, a quantity associated with a porous substance indicating its ability to allow fluid to pass through it; given by the rate of fluid flow through a unit cross section of the substance, subject to a unit pressure gradient while maintained at a specified temperature.

**permeability number** *Engineering*, a number used to indicate the relative ability of a substance to allow a fluid to permeate its surface.

**permeability trap** *Geology*, an oil trap formed by lateral variation of permeability within a reservoir bed.

**permeability tuning** *Electricity*, the process of tuning a resonant circuit by moving a ferrite core in or out of a coil, thus changing the effective permeability of the core and the inductance of the circuit.

**permeable** [per'mē ə bəl] *Science*, capable of being permeated. *Chemistry*, specifically, capable of being passed through by very small particles, such as ions.

**permeable bed** *Geology*, a porous reservoir formation through which oil, natural gas, or water can flow.

**permeable membrane** *Physical Chemistry*, a thin layer of natural or synthetic material that allows some substances, but not others, to pass through it; used in reverse osmosis.

**permeameter** *Engineering*, a device for measuring the permeability of soils or other materials, usually consisting of two reservoirs connected by a conduit containing the material being measured, as water is passed from one reservoir under varying conditions through the connecting conduit.

**permeametry** *Analytical Chemistry*, a method of measuring the average size of small particles in a gas or liquid by passing the mixture through a powder bed of known dimensions and recording the pressure drop and flow rate.

**permeance** *Electromagnetism*, the reciprocal of the reluctance of a magnetic circuit, symbolized by  $P$  and determined by the magnetic flux divided by the magnetomotive force.

**permeant** *Ecology*, an organism that habitually moves from community to community.

**permeoplast** *Cell Biology*, a cyanobacterial cell that has been exposed to agents causing spheroplast formation, usually to facilitate genetic transformation.

**permease** *Biochemistry*, a membrane protein that controls the passage of a substance through the membrane.

**permeate** *Science*, to pass, penetrate, or diffuse through.

**permeation** *Chemistry*, the diffusion or penetration of ions, atoms, or molecules through a permeable substance.

**permeation gneiss** *Petrology*, gneiss formed or altered by geochemically mobile materials passing through or into solid rock.

**permeator** *Chemical Engineering*, a membrane device used for separation that allows species to pass from one phase to another.

**Permendur** *Metallurgy*, an iron-cobalt alloy, at times with vanadium, that is suitable for soft magnets when high permeability at high field strength is required.

**permenorm alloy** *Metallurgy*, an iron-nickel alloy used in magnetic amplifiers and as a magnet core material.

**Permian** *Geology*. **1.** a geologic period of the Upper Paleozoic era, extending from the end of the Carboniferous period to the beginning of the Mesozoic era (from about 280 to 225 million years ago). **2.** the rocks formed during that time.

**Permian extinction** *Paleontology*, a period about 245 million years ago during which large numbers of marine invertebrate families and other species became extinct.

**per mil or per mill** *Science*, per thousand.

**permineralization** *Geology*, a process of fossilization by which additional mineral material is deposited in the pore spaces of original hard animal parts.

**permissible dose** *Radiology*, the suggested maximum amount of exposure to radiation over a specified time interval that an individual may safely endure and that is, therefore, allowable by current radiation protection guides.

**permissible length** *Naval Architecture*, a vessel's floodable length multiplied by its factor of subdivision.

**permissible velocity** *Civil Engineering*, the maximum safe speed at which water may flow through a channel, pipe, or other facility.

**permissive action link** *Ordnance*, a safety device that prohibits arming or launching a nuclear weapon system until a specified code or combination has been inserted.

**permissive cell** *Virology*, any cell in which a given virus can replicate, or in which a conditional mutation has no deleterious effects.

**permissive host** *Virology*, any organism or cell culture that permits the replication of a given virus, resulting in a productive infection.

**permissive stop** *Transportation Engineering*, a railroad signal at which trains are permitted to pause and then proceed at a slow speed through a "stop" indication, rather than waiting for the indication to change.

**permissive temperature** *Genetics*, the temperature range within which a given conditional lethal mutant can survive.

**permittivity** see DIELECTRIC CONSTANT.