

The
Condensed Chemical
Dictionary

TENTH EDITION

Revised by

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I

I Symbol for iodine.

I-131. See iodine 131.

IAA. Abbreviation for 3-indoleacetic acid (q.v.).

IATA. Abbreviation for International Air Transport Association (Geneva), which publishes annual regulations for air shipment of hazardous materials.

IBIB. Abbreviation for isobutyl isobutyrate.

-ic. A suffix used in naming inorganic compounds which indicates that the central element is present in its highest oxidation state; thus in ferric chloride (FeCl_3), the iron has an oxidation number of +3, equivalent to its valence; in an ionized state it would have three positive charges (Fe^{+++}). (A recommended change in this system of nomenclature is to use the common name of the element (iron) together with a Roman numeral showing the oxidation number; thus ferric chloride would be iron (III) chloride).

ICC. Abbreviation for ignition control compound.

ice (H_2O). An allotropic, crystalline form of water; melting point 0°C (32°F); latent heat of melting: 80 calories per gram; sp. gr. 0.91; its property of melting under pressure accounts for "slipperiness." Occurs in nature as Ice I, but several other forms are known.

Uses: Preservation of fish at sea; medicine (reduction of swelling).
See also water.

Iceland moss

Properties: A water-soluble gum which gels on cooling.
Derivation: A lichen growing in Scandanavia and Iceland.
Uses: Flavoring alcoholic beverages; food additive; cosmetics.

Iceland spar. A form of calcite having unique optical properties. Used in polarizing light (nicol prism).

ichthammol (ammonium ichthosulfonate).

Properties: Brownish-black, syrupy liquid, burning taste, tarry odor. Incompatible with acids, alkalis, carbonates, hydroxides, mercuric chloride. Soluble in water, alcohol-ether or alcohol-ether-water mixtures; partially soluble in alcohol and ether. Miscible with glycerol. Low toxicity.
Derivation: Aqueous solution of sulfonated ammonium compounds derived from the action of sulfuric acid upon distillates from bituminous shales.

Grade: N.F.

Use: Pharmaceutical products such as skin ointments, cosmetic preparations, special dermatological soaps.

"Ichthymall."³²⁹ Trademark for ichthammol.

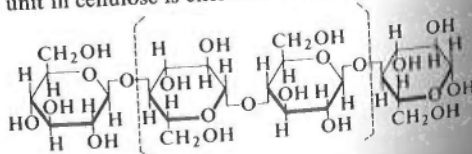
"Ichthyol." Trademark for ichthammol.

-ide. A suffix used in naming compounds comprised of two elements; in such names, the first element, being electropositive, retains its name without change, but the second, being electronegative, utilizes the suffix -ide as a modification of the elemental name. Examples are: sodium hydroxide, magnesium chloride, hydrogen sulfide, etc. Similarly, oxygen is modified to oxide, fluorine to fluoride, phosphorus to phosphide, and carbon to carbide.

ideal gas (perfect gas). A gas in which there is complete absence of cohesive forces between the component molecules; the behavior of such a gas can be predicted accurately by the ideal gas equation through all ranges of temperature and pressure. The concept is theoretical, as no actual gas meets the ideal requirement; carbon dioxide especially lacks conformity. The generalized ideal gas law is derived from a combination of the laws of Boyle and Charles, namely $pV = RT$, where p is pressure, V is volume, T is absolute temperature, and R is the gas constant ($p_0V_0/273.2^\circ\text{C}$).

ideal solution. A solution which exhibits no change of internal energy on mixing and complete uniformity of cohesive forces. Its behavior is described by Raoult's Law (q.v.) over all ranges of temperature and concentrations.

identity period. The repeating unit or monomer which occurs n times in a natural or synthetic polymer molecule; for example, the anhydroglucose unit in cellulose is enclosed in brackets:



Ig Abbreviation for immunoglobulin.

"Igenal."³⁰⁷ Trademark for a series of dyestuffs for chrome-tanned leather. Characterized by unusual tinctorial power.

"Igepal."³⁰⁷ Trademark for a series of biodegradable nonionic surfactants used as detergents, dispersants, emulsifiers, and wetting agents.

CA, CO, DM, RC
ethylene)ethane
of an alkylphenc
formula is RC_2
which R may be
LO and A: A serie
(LO series) and
lates (A series).

"Igepon."³⁰⁷ Tra
factants used as
fiers, dispersant
are sulfo-amide
N-cyclohexylta
general formu
types are sulfo-
and a fatty ac
 RCOOCH_2CH

ignition control
methyl dipheny
which is added
fouling, surface

ignition point.

ignotine. See ca

"Illium."⁴⁹¹ Tra
steel alloys wit

ilmenite (titanic
mineral; black
luster. Resem
readily disting
Sp. gr. 4.5-5;
Occurrence: V
U.S.S.R.; Ind
Uses: Titanium
metal; weldin

Imhoff tank.

considerable
especially fo
features are (I
ment in whic
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hours), the fi
outlet; and (C
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compartment
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vents. The di
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sludge conta
acid, which
See also sew

imidazole (gly

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 257°C . Sol

and no convection occurs. The salt concentration ranges from zero at the surface to 18% or more at the bottom. Results from an experimental salt-gradient pond $180 \times 120 \times 10$ feet indicate that heat can be stored for several months, returning about 14% of the total solar energy absorbed.

solder. A low-melting alloy, usually of the lead-tin type, used for joining metals at temperatures below 800°F . The solder acts as an adhesive, and does not form an intermetallic solution with the metals being joined. See also brazing; welding.

solid. Matter in its most highly concentrated form, i.e., the atoms or molecules are much more closely packed than in gases or liquids, and thus more resistant to deformation. The normal condition of the solid state is crystalline structure—the orderly arrangement of the constituent atoms of a substance in a framework called a lattice. (See crystal). Crystals are of many types, and normally have defects and impurities that profoundly affect their applications, as in semiconductors (q.v.). The geometric structure of solids is determined by x-rays, which are reflected at characteristic angles from the crystal lattices, which act as diffraction gratings. See crystallography.

Some materials that are physically rigid, such as glass, are regarded as highly viscous liquids because they lack crystalline structure. All solids can be melted (i.e., the attractive forces acting between the crystals are disrupted) by heat, and are thus converted to liquids. For ice, this occurs at 0°C ; for some metals the melting point may be as high as 3300°C .

solid state chemistry. Study of the exact arrangement of atoms in solids, especially crystals, with particular emphasis on imperfections and irregularities in the electronic and atomic patterns in a crystal, and the effects of these on electrical and chemical properties. See also crystal; semiconductor; impurity.

"Solthane."²⁷ Trademark for liquid urethane prepolymers which can be cured to produce solid materials of varying degrees of hardness and flexibility.

Uses: For casting and molding mechanical components, sheets, tubing, other shapes; coatings; potting and encapsulation.

"Solka-Floc."²³¹ Trademark for powdered cellulose products derived by mechanical comminution of purified wood pulp. Available in various fiber lengths including dense free-flowing powders. Combustible.

Uses: Filter aid; raw material for cellulose derivatives, filler in rubber; component in welding rod coatings; inert bulking agent in food products.

"Solo."⁷⁹ Trademark for petroleum-insoluble resin. Available in solid, flake and pulverized forms.

Uses: Adhesives; asphalt emulsions; core binders; electrical insulating compounds, fiberboard panels,

insulation batt manufacture; oil emulsions; sulfur grinding.

"Solox."¹⁹² Trademark for a general-purpose solvent formulation comprised of specially denatured alcohol with low percentages of solvent modifiers. Available in regular and anhydrous grades.

"Solprene."³⁰³ Trademark for a solution of polymers of butadiene/styrene.

Uses: Footwear, wire and cable, sponge, floor tile and cove base, and other molded and extruded goods.

"Solricin" 135.²⁰² Trademark for 35% aqueous solution of potassium ricinoleate. Mild germicide; synergizes phenol coefficients of disinfectants.

"Solricin" 285.²⁰² Trademark for an 85% aqueous solution of ammonium ricinoleate; used as a rust-proofing agent.

solubility. The ability or tendency of one substance to blend uniformly with another, e.g., solid in liquid, liquid in liquid, gas in liquid, gas in gas. Solids vary from 0 to 100% in their degree of solubility in liquids, depending on the chemical nature of the substances; to the extent that they are soluble, they lose their crystalline form and become molecularly or ionically dispersed in the solvent to form a true solution. Examples are sugar/water, salt/water. Liquids and gases are often said to be miscible in other liquids and gases, rather than soluble. Thus nitrogen, oxygen, and carbon dioxide are freely miscible in each other, and air is a solution (uniform mixture) of these gases.

The physical chemistry of solubility is an extremely complex mathematical subject in which the principles of electrolytic dissociation, diffusion and thermodynamics play a controlling part. Raoult's law and Henry's law are also involved. See also miscibility; solution, true.

soluble oil. An oil (also called emulsifying oil) which, when mixed with water, produces milky emulsions. In some soluble oils the emulsion is so fine that instead of milky solutions in water, amber colored transparent solutions are formed. Typical examples are sodium and potassium petroleum sulfonates.

Uses: Metal cutting lubricants; textile lubricants; metal boring lubricants; emulsifying agents.

soluble starch. See starch, modified.

"Solulan."⁴⁹³ Trademark for ethoxylated derivatives of lanolin and lanolin components. Some are also acetylated. "Solulan" C-24 is a polyethoxylated cholesterol.

Uses: Pharmaceuticals and cosmetics.

solute. One or more substances dissolved in another substance, called the solvent; the solute is uniformly dispersed in the solvent in the form of either molecules (sugar) or ions (salt), the resulting mixture comprising a solution. See solution (true); solvent.

solution (true). A uniformly dispersed mixture, at

the molecular or ionic level, of one or more substances (the solute) in one or more other substances (the solvent). These two parts of a solution are called phases (q.v.).

Common types are:

liquid/liquid: alcohol/water.

solid/liquid: salt/water.

solid/solid: carbon/iron.

Solutions that exhibit no change of internal energy on mixing and complete uniformity of cohesive forces are called *ideal*; their behavior is described by Raoult's Law. Solutions are involved in most chemical reactions, refining and purification, industrial processing and biological phenomena.

The proportion of substances in a solution depends on their limits of solubility. The solubility of one substance in another is the maximum amount that can be dissolved at a given temperature and pressure. A solution containing such a maximum amount is *saturated*. A state of supersaturation can be created, but such solutions are unstable and may precipitate spontaneously.

solution, colloidal. A liquid colloidal dispersion, often called a sol. Since colloidal particles are larger than molecules, it is strictly incorrect to call such dispersions solutions; however, this term is widely used in the literature.

Note: Wolfgang Ostwald stated, ". . . There are no sharp differences between mechanical suspensions, colloidal solutions, and molecular [true] solutions. There is a gradual and continuous transition from the first through the second to the third." See also colloid chemistry.

solutrope. A ternary mixture having two liquid phases between which one component is distributed in an apparent ratio varying with concentration from less than one to more than one. In other words, the solute may be selectively dissolved in one or the other of the phases or solvents depending on the concentration. This phenomenon has been compared to azeotropic behavior.

"Solvat."²⁴³ Trademark for leuco esters of vat dyes used for wool, cellulose and synthetic fibers.

solvation. In the parlance of colloid chemistry, the adsorption of a microlayer or film of water or other solvent on individual dispersed particles of a solution or dispersion. The term "solvated hulls" has been used to describe such particles. It is also applied to the action of plasticizers on resin dispersions in plastisols (q.v.).

See also hydration (2).

Solvay process (ammonia soda process). Manufacture of sodium carbonate (soda ash, Na_2CO_3) from salt, ammonia, carbon dioxide and limestone by an ingenious sequence of reactions involving recovery and reuse of practically all the ammonia and part of the carbon dioxide. Limestone is heated to produce lime and carbon dioxide. The latter is dissolved in

water containing the ammonia and salt, with resultant precipitation of sodium bicarbonate. This is separated by filtration, dried and heated to form normal sodium carbonate. The liquor from the bicarbonate filtration is heated and treated with lime to regenerate the ammonia. Calcium chloride is a major byproduct.

Note: Because this process requires much energy and pollutes streams and rivers with chloride effluent many plants using it have closed, production being obtained from the natural deposits in western U.S.

"Solvenol."²⁶⁶ Trademark for a group of monocyclic terpene hydrocarbons with minor amounts of terpene alcohols and ketones.

Uses: General solvent; rubber reclaiming.

solvent. A substance capable of dissolving another substance (solute) to form a uniformly dispersed mixture (solution) at the molecular or ionic size level. Solvents are either polar (high dielectric constant) or non-polar (low dielectric constant). Water, the most common of all solvents, is strongly polar (dielectric constant 81), but hydrocarbon solvents are non-polar. Aromatic hydrocarbons have higher solvent power than aliphatics (alcohols). Other organic solvent groups are esters, ethers, ketones, amines and nitrated and chlorinated hydrocarbons.

The chief uses of organic solvents are in the coatings field (paints, varnishes and lacquers), industrial cleaners, printing inks, extractive processes, and pharmaceuticals. Since many solvents are flammable and toxic to varying degrees, they contribute to air pollution and fire hazards. For this reason their use in coatings and cleaners has declined in recent years. For specific properties and uses, see individual compound.

solvent, aprotic. A solvent that cannot act as a proton acceptor or donor, i.e., as an acid or base.

solvent drying. Removal of water from metal surfaces by means of a solvent that displaces it preferentially, as on precision equipment, electronic components, etc. Examples of solvents used are acetone, 1,1,2-trichloro-1,2,2-trifluoroethane, 1,1,1-trichloroethane.

solvent dye. See dye; solvent.

solvent extraction. A separation operation which may involve three types of mixtures: (a) a mixture composed of two or more solids, such as a metallic ore; (b) a mixture composed of a solid and a liquid; (c) a mixture of two or more liquids. One or more components of such mixtures are removed (extracted) by exposing the mixture to the action of a solvent in which the component to be removed is soluble. If the mixture consists of two or more solids, extraction is performed by percolation of an appropriate solvent through it. This procedure is also called leaching, especially if the solvent is water. Coffee-making is an example. Synthetic fuels can be