



世界最新 英汉双解有机化学词典

主 编 John Daintith
主 译 杨秉勤
主 审 史 真

The Facts On File
Dictionary of Organic Chemistry

世界图书出版公司

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John Daintith

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序

本套词典共 8 册,分别为《世界最新英汉双解生物学词典》、《世界最新英汉双解细胞与分子生物学词典》、《世界最新英汉双解生物化学词典》、《世界最新英汉双解植物学词典》、《世界最新英汉双解生物技术和遗传工程词典》、《世界最新英汉双解化学词典》、《世界最新英汉双解无机化学词典》、《世界最新英汉双解有机化学词典》。本套词典囊括了科学重要分支中使用的术语和概念。

《有机化学词典》涵盖了有机化学中的基本概念、化合物分类、反应机制以及重要有机化合物的命名。另外,我们也介绍了一些生物化学方面的重要化合物和一些关键的生物化学过程的信息。书中词目定义明确,并尽可能附加化学结构的图表,此外还附有本领域具有突出贡献人物的短小传记。附录包括羧酸、氨基酸、糖、含氮碱基和核苷的结构信息,以及化学元素总表和元素周期表。附录还提供了一些有用的网页和参考书目。

译者序

本词典以有机化学基本概念、元素及重要有机化合物的基本知识为主,扩展到分析化学、物理化学、生物化学、有机化学领域的一些基本词汇,共有二千多条词目,内容还包括在这些领域作出过重要贡献的一些科学家的简介以及实验技术等。附录中列出了常见的羧酸、氨基酸、所有化学元素并附有元素周期表,同时还提供了一些有帮助的网页和参考文献。本词典词目释义准确、新颖,文字叙述简明、通俗。词目按英文字母顺序排列,双语形式出版。本词典可作为教师的双语教学用书以及相关专业大学生、化学工作者的工具用书。

参与本词典翻译工作的还有张秉林、杨建武老师。张晶、李涛、宁伟等同学参与了本词典的校对工作。史真老师参与了本书的审阅工作,并对本书的翻译提出了许多宝贵意见。在此表示衷心的感谢。

在本书的翻译过程中,尽管全体译、审、校人员做了大量细致的工作,但是由于时间紧,加之我们的翻译水平有限,书中难免存在错误及疏漏,恳请读者批评、指正。

译者

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致 谢

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凡 例

一、本词典为英汉双解,采用双栏排版,左栏为英文原文,右栏为相应的中文部分;由于两种语言的不同,英汉两部分的内容并非完全对应。

二、英文首词条和相应的中文首词条的字体均采用黑体,解释部分的字体均为白体。若英文首词条有缩略语,则该缩略语置于英文首词条后的括号,中文首词条后的括号中也加入相应缩略语,例如:

abscisic acid (ABA)...

脱落酸 (ABA).....

英文术语的其他名称置于英文首词条后的括号,相应的中文名称也置于中文首词条后的括号中,例如:

aerobic respiration (oxidative metabolism)... **有氧呼吸** (氧化代谢).....

三、内容的排列顺序以英文首词条的英文拼法顺序排列,后面括号中的缩略语及其他名称不参加排序。

四、词条的解释:

1. 如整体释义分层次解释的,则列小标题讲解,以突出不同梯度的知识点,例如:

Atom ...	1. ...	原子	1.
	2. ...		2.
	3. ...		3.

2. 词汇中一般出现的人名不予翻译,但已约定成俗的则列出对应中文。

3. 英文中的斜体、大小写均严格按相关规定书写。

4. 有些词条需参照或对比其他词条,则列出要参阅的词条,并且中文部分亦标出参阅的词条。例如:

absolute configuration ...See optical activity.

绝对构型 参阅 optical activity.

adiabatic change... Compare isothermal change.

绝热变化 参阅 isothermal change.

五、正文后附有九个附录和文献目录。

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A

ABA See abscisic acid.

abscisic acid (ABA) A PLANT HORMONE once thought to be responsible for the shedding (abscission) of flowers and fruit and for the onset of dormancy in buds (hence its early name, *dormin*). The compound is associated with the closing of pores (stoma) in the leaves of plants deprived of water.

absolute alcohol Pure alcohol (ethanol).

absolute configuration A particular molecular configuration of a CHIRAL molecule, as denoted by comparison with a reference molecule or by some sequence rule. There are two systems for expressing absolute configuration in common use: the *D-L* convention and the *R-S* convention. See optical activity.

absolute temperature Symbol: *T* A temperature defined by the relationship:

$$T = \theta + 273.15$$

where θ is the Celsius temperature. The absolute scale of temperature was a fundamental scale based on Charles' law, which applies to an ideal gas;

$$V = V_0(1 + \alpha\theta)$$

ABA 参阅 abscisic acid.

脱落酸 (ABA) 一种植物激素, 被认为与花朵和果实的脱落以及胚芽的休眠有关(它最早的名字休眠素就由此而来)。该化合物与植物叶孔(气孔)在缺水时的关闭有关。

无水乙醇 纯酒精(乙醇)。

绝对构型 手性分子所具有的特殊分子构型, 通过与参照分子比较或通过一些序列规则来表示。目前, 有两种普遍使用的表达绝对构型的体系: *D-L* 构型和 *R-S* 构型。参阅 optical activity。

绝对温度 符号: *T* 由关系式 $T = \theta + 273.15$ 定义的温度, 其中 θ 是指摄氏温度。温度的绝对标度是一个基本刻度, 其基于适用于理想气体的查尔斯定律制定。查尔斯定律, $V = V_0(1 + \alpha\theta)$, 其中 *V* 代表温度为 θ 时的体积, V_0 代表温度为 0 时的体积, α 为气体的热膨胀系数。低压时(真实气体表现出理想气体的行为) α 值为 $1/273.15$ 。因此, 在

where V is the volume at temperature θ , V_0 the volume at 0, and α the thermal expansivity of the gas. At low pressures (where real gases show ideal behavior) α has the value $1/273.15$. Therefore, at $\theta = -273.15$ the volume of the gas theoretically becomes zero. In practice substances become solids at these temperatures; however, the extrapolation can be used for a scale of temperature on which -273.15°C corresponds to 0° (*absolute zero*). The scale is also known as the *ideal-gas scale*; on it temperature intervals were called *degrees absolute* ($^\circ\text{A}$) or *degrees Kelvin* ($^\circ\text{K}$), and were equal to the Celsius degree. It can be shown that the absolute temperature scale is identical to the currently used thermodynamic temperature scale (on which the unit is the KELVIN).

absolute zero The zero value of thermodynamic temperature; 0°K or -273.15°C . See absolute temperature.

absorption 1. A process in which a gas is taken up by a liquid or solid, or in which a liquid is taken up by a solid. In absorption, the substance absorbed goes into the bulk of the material. Solids that absorb gases or liquids often have a porous structure. The absorption of gases in solids is sometimes called *sorption*. There is a distinction between *absorption* (in which one substance is assimilated into the bulk of another) and *adsorption* (which involves attachment to the surface). Sometimes it is not obvious

$\theta = -273.15$ 时,理论上气体的体积为零。实际上,物质在这一温度时已变成了固体。然而,利用外推法可确定温度的一个刻度,即 -273.15°C 对应于 0° (绝对零度)。此刻度也被作为理想气体刻度;基于它所得出的温度间隔被称为绝对度($^\circ\text{A}$)或开尔文度($^\circ\text{K}$),而且与摄氏度相等。可证明绝对温标和现在使用的热力学温标(单位是开尔文)相同。

绝对零度 热力学温度的零值: 0°K 或 -273.15°C 。参阅 absolute temperature.

吸收 1. 吸收是指气体被吸入液体或固体中,或者液体被吸入固体中的过程。在吸收过程中,被吸收的物质进入物质的内部。吸收气体或液体的固体通常具有多孔结构。固体吸收气体有时被称为吸附。吸收(物质被吸收进入另一物质内)和吸附(包括黏附于表面)之间存在区别。有时发生的是哪种过程不很明显。例如,一种多孔的固体(如活性炭)可以称为吸收大量的气体,但实际上所发生的是在材质内部管孔大的表面上的吸附过程。

2. 电磁辐射、粒子或声波通过一种

which process is occurring. For example, a porous solid, such as activated CHARCOAL may be said to *absorb* a large volume of gas, but the process may actually be *adsorption* on the high surface area of internal pores in the material.

2. The process in which electromagnetic radiation, particles, or sound waves lose energy in passing through a medium. Absorption involves conversion of one form of energy into another.

absorption spectrum See spectrum.

accelerator A substance that increases the rate of a chemical reaction. In this sense the term is synonymous with CATALYST. It is common to refer to catalysts as 'accelerators' in certain industrial applications. For example, accelerators are used in the VULCANIZATION of rubber and in the polymerization of adhesives. Also, in the production of composite materials using polyester resins a distinction is sometimes made between the catalyst (which initiates the polymerization reaction) and the accelerator (which is an additional substance making the catalyst more effective). The terms *promoter* and *activator* are used in a similar way.

acceptor The atom or group to which a pair of electrons is donated in forming a COORDINATE BOND.

accessory pigment See photosynthetic pigments.

介质而失去能量的过程。吸收包括从一种能量形式向另一种形式的转化过程。

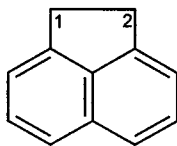
吸收光谱 参阅 spectrum。

加速剂 一种能加快化学反应速率的物质。从这种意义上讲,该术语与催化剂同义。在某些工业应用中,通常称催化剂为加速剂。例如,加速剂被用于橡胶硫化和胶黏剂的聚合。同样,在用聚酯树脂合成复合材料时,有时催化剂(引发聚合反应)和加速剂(作为一种添加物使催化剂更有效)是有区别的。术语促进剂和活化剂的用法类似。

受体 指接受一对电子形成配价键的原子或原子团。

辅助色素 参阅 photosynthetic pigments。

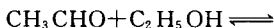
acenaphthene ($C_{12}H_{10}$) A colorless crystalline derivative of naphthalene, used in producing some dyes.



Acenaphthene

茚

acetal A type of compound formed by reaction of an alcohol with either an aldehyde or a ketone. The first step in formation of an acetal is the formation of an intermediate, known as a *hemiacetal*. For example, ethanal (acetaldehyde; CH_3CHO) reacts with ethanol (C_2H_5OH) as follows:



The hemiacetal has a central carbon atom (from the aldehyde) attached to a hydrogen, a hydroxyl group, a hydrocarbon group (CH_3), and an alkoxy group (C_2H_5O). If a ketone is used rather than an aldehyde, the resulting hemiacetal contains two hydrocarbon groups. For example, reaction of the ketone R^1COR^2 with the alcohol R^3OH is:

$$R^1COR^2 + R^3OH \rightleftharpoons CR^1R^2(OH)(OR^3)$$

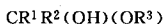
The formation of a hemiacetal is an example of NUCLEOPHILIC ADDITION to the carbonyl group of the aldehyde or ketone. The first step is attack of the lone pair on the O of the alcohol on the (positively charged) C of the carbonyl group. This is catalyzed by both acids and bases.

茚 ($C_{12}H_{10}$) 一种萘的衍生物, 为无色晶体, 用于一些染料的生产。

缩醛 一类由醇与醛或酮反应形成的化合物。形成缩醛的第一步是形成中间产物, 即半缩醛。例如, 乙醛 (CH_3CHO) 与乙醇 (C_2H_5OH) 的反应:

$$CH_3CHO + C_2H_5OH \rightleftharpoons$$


半缩醛有一个连有一个氢原子、一个羟基、一个烃基 (CH_3) 和一个烷氧基 (C_2H_5O) 的中心碳原子 (来自醛)。如果使用酮而非醛时, 产生的半缩醛含有两个烃基。例如, 酮 R^1COR^2 与醇 R^3OH 的反应:

$$R^1COR^2 + R^3OH \rightleftharpoons$$


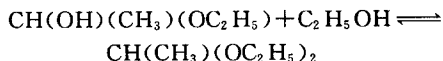
半缩醛的形成是醛或酮羰基亲核加成反应的一个例子。第一步是醇的 O 原子上的孤对电子进攻带正电性的羰基 C。这个反应可用酸或碱催化。酸催化是通过羰基上 O 的质子化作用, 使 C 具有正电性而易受亲核试剂进攻。在碱催化时, 由于 OH^- 离子的影响使醇的 $-OH$ 基成为一个更有效的亲核试剂。

总之, 因为半缩醛很易分解成原来的醇和醛或酮, 所以它们只存在于溶液中并且不能被分离出来。然而, 一些环状的半缩醛更稳定, 如糖分子的环状形式是半缩醛。

Acid catalysis occurs by protonation of the O on the carbonyl, making the C more negative and more susceptible to nucleophilic attack. In base catalysis the OH^- ions from the base affect the $-\text{OH}$ group of the alcohol, making it a more effective nucleophile.

In general, hemiacetals exist only in solution and cannot be isolated because they easily decompose back to the component alcohol and aldehyde or ketone. However, some cyclic hemiacetals are more stable. For example, cyclic forms of SUGAR molecules are hemiacetals.

Further reaction of hemiacetals with another molecule of alcohol leads to a full acetal. For example:



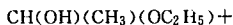
The overall reaction of an aldehyde or ketone with an alcohol to give an acetal can be written:



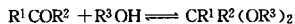
It is also possible to have 'mixed' acetals with the general formula $\text{CR}^1\text{R}^2(\text{OR}^3)(\text{OR}^4)$. Note that if the acetal is derived from an aldehyde, then R^1 and/or R^2 may be a hydrogen atom. The mechanism of formation of an acetal from a hemiacetal is acid catalyzed. It involves protonation of the $-\text{OH}$ group of the hemiacetal followed by loss of water to form an oxonium ion, which is attacked by the alcohol molecule.

Formerly it was conventional to use the terms 'hemiacetal' and 'acetal' for compounds formed by reaction between al-

半缩醛进一步和另一醇分子反应生成缩醛。如:



醛或酮与醇反应生成缩醛的总反应可写为:



混合缩醛可用通式 $\text{CR}^1\text{R}^2(\text{OR}^3)(\text{OR}^4)$ 表示。应当注意,如果缩醛是由一种醛生成的,那么 R^1 和(或) R^2 可能是一个氢原子。由半缩醛生成缩醛是由酸催化的。它包括半缩醛 $-\text{OH}$ 基团的质子化及失水生成氧鎓离子,氧鎓离子再被醇分子进攻。

以前,通常使用“半缩醛”和“缩醛”来表示由醛和醇反应形成的化合物。酮和醇之间的类似反应生成的化合物叫做半缩酮和缩酮。现在的命名法使用“半缩醛”和“缩醛”表示由醛或酮生成的化合物,而保留“半缩酮”和“缩酮”表示那些由酮生成的化合物。换句话说,缩酮是缩醛的一个子类,而半缩酮是半缩醛的一个子类。

dehydes and alcohols. Similar reactions between ketones and alcohols gave rise to compounds called *hemiketals* and *ketals*. Current nomenclature uses 'hemiacetal' and 'acetal' for compounds derived from either an aldehyde or a ketone, but reserves 'hemiketal' and 'ketal' for those derived from ketones. In other words, the ketals are a subclass of the acetals and the hemiketals are a subclass of the hemiacetals.

acetaldehyde See ethanal.

acetamide See ethanamide.

acetate See ethanoate.

acetic acid See ethanoic acid.

acetone See propanone.

acetonitrile See methyl cyanide.

acetophenone See phenyl methyl ketone.

acetylation See acylation.

acetyl chloride See ethanoyl chloride.

acetylcholine (ACh) A neurotransmitter found at the majority of synapses, which occur where one nerve cell meets another.

acetylene See ethyne.

acetyl group See ethanoyl group.

acetylde See carbide.

乙醛 参阅 ethanal.

乙酰胺 参阅 ethanamide.

乙酸盐 参阅 ethanoate.

乙酸 参阅 ethanoic acid.

丙酮 参阅 propanone.

乙腈 参阅 methyl cyanide.

苯乙酮 参阅 phenyl methyl ketone.

乙酰化作用 acylation.

乙酰氯 参阅 ethanoyl chloride.

乙酰胆碱 (ACh) 一种神经递质, 见于大多数神经突触中, 突触为一个神经细胞与另一个神经细胞的连接处。

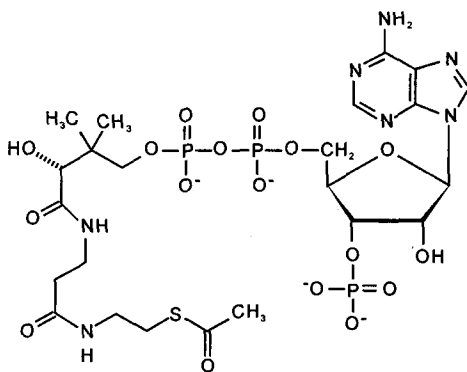
乙炔 参阅 ethyne.

乙酰基 参阅 ethanoyl group.

炔化物 参阅 carbide.

acetyl CoA (acetyl coenzyme A) An important intermediate in cell metabolism, particularly in the oxidation of sugars, fatty acids, and amino acids, and in certain biosynthetic pathways. It is formed by the reaction between pyruvate (from GLYCOLYSIS) and COENZYME A, catalyzed by the enzyme pyruvate dehydrogenase. The acetyl group of acetyl CoA is subsequently oxidized in the KREBS CYCLE, to yield reduced coenzymes and carbon dioxide. Acetyl CoA is also produced in the initial oxidation of fatty acids and some amino acids. Other key roles for acetyl CoA include the provision of acetyl groups in biosynthesis of fatty acids, terpenoids, and other substances.

乙酰 CoA (乙酰辅酶A) 细胞代谢的一种重要中间产物, 特别是在糖、脂肪酸和氨基酸类的氧化以及某些生物合成途径中。在丙酮酸脱氢酶催化下, 由丙酮酸盐(糖原酵解产物)和辅酶 A 反应形成。乙酰 CoA 的乙酰基随后在三羧酸循环中被氧化, 产生还原型辅酶和二氧化碳。在脂肪酸和一些氨基酸的初始氧化中也会生成乙酰 CoA。乙酰 CoA 的其他重要功能包括在脂肪酸、萜类化合物及其他物质的生物合成中提供乙酰基。



Acetyl CoA
乙酰辅酶 A

acetyl coenzyme A See acetyl CoA.

乙酰辅酶A 参阅 acetyl CoA.

acetylsalicylic acid See aspirin.

乙酰水杨酸 参阅 aspirin.

ACh See acetylcholine.

乙酰胆碱 参阅 acetylcholine.

achiral Describing a molecule that does not have chiral properties; i. e. one that does not exhibit OPTICAL ACTIVITY.

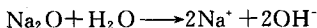
acid A substance that contains hydrogen and dissociates in solution to give hydrogen ions:



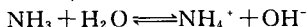
More accurately, the hydrogen ion is solvated (a hydroxonium ion):



Strong acids are completely dissociated in water. Examples are sulfuric acid and trichloroethanoic acid. *Weak acids* are only partially dissociated. Most organic carboxylic acids are weak acids. In distinction to an acid, a *base* is a compound that produces hydroxide ions in water. Bases are either ionic hydroxides (e. g. NaOH) or compounds that form hydroxide ions in water. These may be metal oxides, for example:



Ammonia, amines, and other nitrogenous compounds can also form OH^- ions in water:



As with acids, *strong bases* are completely dissociated; *weak bases* are partially dissociated.

This idea of acids and bases is known as the *Arrhenius theory* (named for the Swedish physical chemist Svante August Arrhenius (1859–1927)).

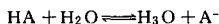
In 1923 the Arrhenius idea of acids

非手性的 用于描述没有手性特征分子, 即不具有光学活性的分子。

酸 一种含有氢原子并且能够在溶液中解离出氢离子的物质:



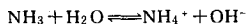
更准确地说, 是氢离子被溶剂化(水合氢离子):



强酸在水中会完全解离, 如硫酸和三氯乙酸。弱酸仅部分解离。大多数有机羧酸是弱酸。与酸不同, 碱是指能在水中产生氢氧根离子的化合物。碱既包括离子型的氢氧化物(例如NaOH), 也包括在水中形成氢氧根离子的化合物。这些化合物可以是金属氧化物, 如:



氨水、胺和其他含氮化合物也能在水中形成 OH^- 离子:

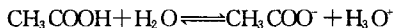


像酸一样, 强碱可完全地解离, 弱碱部分解离。

酸和碱的概念即 Arrhenius 理论, 以瑞典物理化学家 Svante August Arrhenius (1859–1927) 的名字命名。

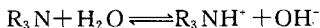
1923 年 Arrhenius 酸碱概念分别被英国化学家 Thomas Martin Lowry (1874–1936) 和丹麦物理化学家 Johannes Nicolaus Brønsted (1879–1947) 扩展。在 Lowry–Brønsted 理论中, 酸是指任何可以提供质子的化合物, 而碱是指任何能接受质子的化合物。质子供体被称为 Brønsted 酸(或质子酸), 质子受体被称为 Brønsted 碱。例如, 在反应:

and bases was extended by the British chemist Thomas Martin Lowry (1874 - 1936) and, independently, by the Danish physical chemist Johannes Nicolaus Brønsted (1879 - 1947). In the *Lowry - Brønsted theory* an acid is a compound that can donate a proton and a base is a compound that can accept a proton. Proton donors are called *Brønsted acids* (or *protic acids*) and proton acceptors are called *Brønsted bases*. For example, in the reaction:

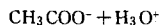
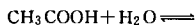


the CH_3COOH is the acid, donating a proton H^+ to the water molecule. The water is the base because it accepts the proton. In the reverse reaction, the H_3O^+ ion is the acid, donating a proton to the base CH_3COO^- . If two species are related by loss or gain a proton they are described as *conjugate*. So, in this example, CH_3COO^- is the *conjugate base* of the acid CH_3COOH and CH_3COOH is the *conjugate acid* of the base CH_3COO^- .

In a reaction of an amine in water, for example:

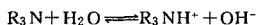


The amine R_3N accepts a proton from water and is therefore acting as a base. R_3NH^+ is its conjugate acid. Water donates the proton to the R_3N and, in this case, water is acting as an acid (H_3O^+ is its conjugate base). Note that water can act as both an acid and a base depending on the circumstances. It can accept a proton (from



CH_3COOH 是酸, 向水分子转移一个质子 H^+ 。水分子是碱, 因为它接受质子。在逆反应中, H_3O^+ 离子是酸, 转移一个质子给碱 CH_3COO^- 。如果两种物质因得失一个质子而相关, 则认为二者共轭。因此, 在这个例子中, CH_3COO^- 是酸 CH_3COOH 的共轭碱, 而 CH_3COOH 是碱 CH_3COO^- 的共轭酸。

胺在水中的反应, 例如:



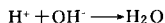
其中胺 R_3N 作为碱, 接受来自水的一个质子, R_3NH^+ 是它的共轭酸。在此反应中, 水作为酸提供质子给 R_3N , H_3O^+ 是它的共轭碱。注意, 水在不同的环境中, 既可能是酸也可能是碱。它能(从 CH_3COOH)接受一个质子, 也能提供一个质子(给 R_3N)。这类化合物被称为两性物质。

由于 Lowry - Brønsted 理论包括了质子传递, 由此该理论的一个重要方面是反应中不必一定包括水。可将非水溶剂如液氨中的反应用酸碱反应来描述。

同样在 1923 年, 由美国物理化学家 Gilbert Newton Lewis (1875 - 1946) 提出的 Lewis 理论是对酸碱概念的进一步广义化。在 Lewis 理论中, 酸 (Lewis 酸) 是指能接受一对电子的化合物, 碱 (Lewis 碱) 是指能提供一对电子的化合物。传统的酸碱反应如:



其有效的反应是



其中 OH^- (碱) 提供电子对给 H^+ (酸)。然而, 在 Lewis 理论中酸和碱根本不需要涉及质子。例如, 氨