

CIP Rules

- [Cahn Ingold Prelog Rules](#)

Circular Dichroism

Synonyms

[CD](#)

Definition

In chemistry, circular dichroism (CD) refers to the differential absorption of left and right-handed circularly polarized light by optically active ► [chiral](#) molecules. Electromagnetic radiation consists of electric and magnetic fields that oscillate perpendicular to one another and to the direction of propagation. Linearly polarized light occurs when the electric field vector oscillates only in one plane and changes in magnitude, while circularly polarized light occurs when the electric field vector rotates about its propagation direction and retains constant magnitude. It thus forms a helix propagating in space.

When circularly polarized light passes through an optically active light-absorbing medium, the velocities and wavelengths of its right and left polarizations differ as does the extent to which they are absorbed. CD is the difference in the amount of absorption between the two. Since circularly polarized light is “chiral,” it interacts differently with different chiral molecules. At the quantum mechanical level, the information provided by circular dichroism and optical rotation measurements are identical. Depending on the wavelength employed, CD can be used to investigate the structures of proteins, nucleic acids, small organic molecules, and charge-transfer transitions.

See also

- [Chirality](#)
- [Polarized Light and Homochirality](#)

Circumplanetary Disk

- [Planetary Rings](#)

Circumstellar Disk

- [Protoplanetary Disk](#)

Circumstellar Dust Disks

- [Debris Disk](#)

Cirrus Cloud

Definition

In astronomy, cirrus clouds are sources of infrared (IR) emission detected by the ► [InfraRed Astronomy Satellite \(IRAS\)](#), a joint project of the US, the UK, and the Netherlands which surveyed the sky at wavelengths of 12, 25, 60, and 100 μm . The spatial distribution of this IR emission is similar in appearance to terrestrial cirrus clouds, although the latter have nothing to do with the interstellar clouds. The astronomical emission arises from interstellar dust in our galaxy, particularly that associated with the diffuse portions of interstellar clouds.

See also

- [Infrared Astronomical Satellite](#)
- [Interstellar Dust](#)

Cistron

- [Gene](#)

Citric Acid Cycle

JULI PERETÓ

Cavanilles Institute for Biodiversity and Evolutionary Biology and Department of Biochemistry and Molecular Biology, University of València, València, Spain

Synonyms

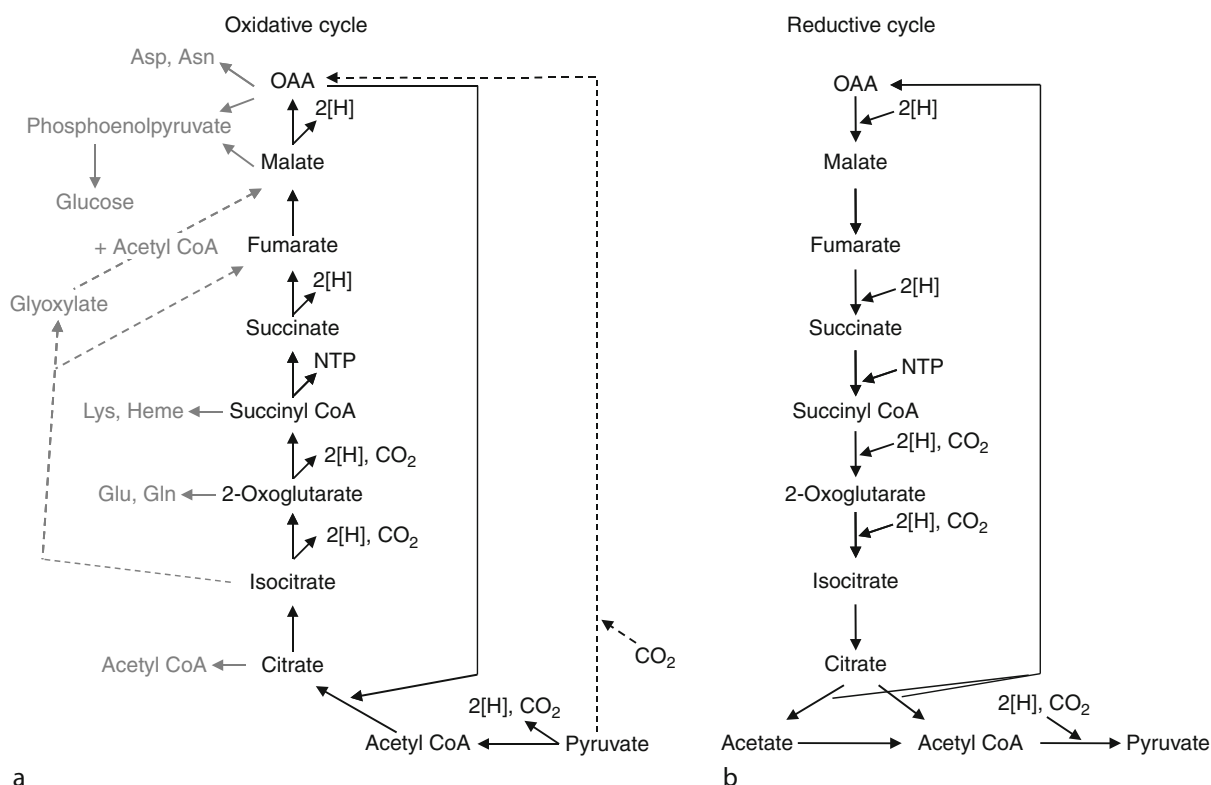
[Krebs cycle](#); [Tricarboxylic acid \(TCA\) cycle](#)

Keywords

Anaplerosis, cataplerosis, catalytic cycle, oxidative metabolism

Definition

Citric acid cycle is a metabolic pathway often regarded as the final step for the complete oxidation of fuel molecules.



Citric Acid Cycle. Figure 1 The citric acid cycle. **(a)** Oxidative cycle. An anaplerotic reaction is shown (broken black line), as well as some biosynthetic branches starting from cycle intermediates (in gray). The glyoxylate shunt is also shown (broken gray line). **(b)** Reductive cycle

Stoichiometrically, a 2-C molecule (acetyl CoA) condenses with a 4-C molecule (oxaloacetate) to yield citrate (Fig. 1a). Two consecutive oxidative decarboxylations transform the initial 2-C unit into two CO_2 molecules. The regeneration of oxaloacetate closes the cycle through an oxidative process. In addition to the electrons taken up by redox coenzymes ($NAD(P)^+$ and FAD), a part of the energy is conserved in a substrate-level phosphorylation step yielding GTP. The citric acid cycle can also be regarded as a source of biosynthetic precursors. In some organisms, the cycle operates in reverse, reductively, thus functioning as an autotrophic pathway (Fig. 1b).

History

In an elegant series of experiments on substrate oxidation in respiratory animal tissues, performed among others by Albert Szent-Györgyi (1893–1986), Carl Martius (1906–1993), and Franz Knoop (1875–1946), fragments of a sequence of the metabolic transformations were established. Those observations were completed by Hans A. Krebs (1900–1981) who proposed, in a paper

co-authored by William A. Johnson, the cyclic nature of the pathway in 1937 (Krebs and Johnson 1937).

Overview

The citric acid cycle occupies a central position in the metabolic network both as a ► **catabolic**, oxidative process and as a supplier of biosynthetic precursors. The cycle is more a roundabout (or traffic circle) than a carousel: There is a permanent flux of metabolites in and out the cycle. Some metabolites are used for biosynthetic purposes (e.g., 2-oxoglutarate as glutamate precursor or succinyl CoA for the biosynthesis of heme group or lysine, see Fig. 1a). The catalytic nature of the citric acid cycle, as well as the consumption of intermediates as biosynthetic precursors, imposes the necessity of the net synthesis and replacement of those intermediates. This process is termed anaplerosis. Anaplerotic reactions include the synthesis of oxaloacetate by pyruvate carboxylation, and the synthesis of oxaloacetate or 2-oxoglutarate from aspartate or glutamate, respectively, by transamination. On the other hand, the 4-C and 5-C skeletons derived from amino acid

catabolism must leave the cycle to be fully oxidized (this process has been called cataplerosis (Owen et al. 2002).

In some autotrophic microorganisms, the citric acid cycle operates in a reverse, reductive way (Fig. 1b). This pathway (also known as the Arnon-Buchanan cycle) allows the net synthesis of Acetyl CoA from CO₂. Firstly described by Daniel I. Arnon and Robert B. Buchanan in 1966 as the autotrophic carbon fixation pathway in the green sulfur bacterium *Chlorobium limicola* (Evans et al. 1966), it is also present in some proteobacteria and some members of the domain Archaea (Berg et al. 2010).

See also

- [Anabolism](#)
- [Carbon Dioxide](#)
- [Catabolism](#)
- [Glycolysis](#)
- [Metabolism \(Biological\)](#)

References and Further Reading

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Classification

- [Taxonomy](#)

Clastation

- [Weathering](#)

Clathrate

Definition

In chemistry, a clathrate is an inclusion complex, also known as a clathrate compound, cage or a host–guest

complex, in which a molecule, aggregate of molecules or crystal lattice of molecules (the “host”) noncovalently traps or encloses another, usually small, gas molecule (the “guest”), rendering it incapable of escaping by diffusion. The word is derived from the Latin word *clatratus*, meaning “with bars” or “a lattice.”

Especially important naturally occurring types of clathrates are ► [clathrate hydrates](#), formed from water ices and various gases such as methane, ammonia or CO₂, and zeolite minerals.

See also

- [Clathrate Hydrate](#)

Clathrate Hydrate

Definition

Clathrate hydrates are ice-like solids in which a “host” hydrogen-bonded H₂O lattice entraps a nonpolar “guest” gas molecule such as CH₄ or CO₂. It has been speculated that clathrate hydrates are important components of many outer solar system bodies including comets, the outer planets, and their icy moons. Methane clathrate hydrates are also widely distributed in terrestrial seafloor sediments where the ambient temperature and pressure allows their existence. It is thought that their breakdown during periods of increasing temperature releases methane, a strong greenhouse gas, which may contribute significantly to global warming.

See also

- [Clathrate](#)

Clay

ALICIA NEGRÓN-MENDOZA

Instituto de Ciencias Nucleares, Universidad Nacional Autónoma de México, Coyoacán, DF, Mexico

Synonyms

[Argillaceous earth](#); [Clay minerals](#)

Keywords

Chemical evolution, clay, clay minerals, montmorillonite, phyllosilicates