

Pyrimidines

Pyrimidine is a six-membered heterocyclic compound that includes nitrogen heteroatoms in the **1 and 3** positions. The system of conjugated bonds determines its aromatic character.

Chemical properties

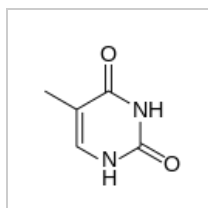
File:Pyrimidine num.svg
Pyrimidine numbering

Pyrimidine has ``basic properties *due to the free electron pairs of both nitrogens*. At the same time, however, the energy of the π -electrons decreases and the molecule is less prone to electrophilic substitution and, conversely, more prone to nucleophilic substitution. The first nitrogen and carbons 4-6 come from **aspartate**, the second carbon comes from **HCO₃⁻**, the second carbon comes from amide of the **glutamine** group. The pyrimidine precursor carbamyl phosphate is formed from glutamine and HCO₃⁻, another precursor is aspartate itself. "Carbamyl phosphate" and "aspartate" by connecting with "N-carbamylaspartate" give the formation of "dihydroorotate". Further reactions gradually produce ``uridine-5'-monophosphate (UMP), the main intermediate of pyrimidine synthesis, which is formed by decarboxylation. ``UMP-synthase ensures the last two steps leading to pyrimidine formation.

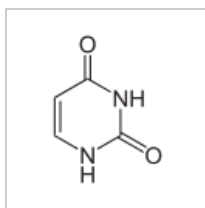
Pyrimidine derivatives

 For more information see Nucleotide.

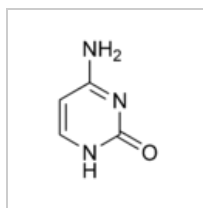
Pyrimidine is the basis of some nitrogenous bases: thymine, uracil and cytosine. These are attached via an N-glycosidic bond to ribose or deoxyribose and form nucleosides. Thymine is found in DNA, while uracil is found in nature only in RNA. Both are complementary to adenine, to which they are linked by two hydrogen bonds. Cytosine is complementary to guanine and forms three hydrogen bonds.



Thymine



Uracil



Cytosine

[[File:Thiamin.svg|thumb|right|200px|Vitamin B₁ (thiamin)]]In addition to the main base, minor bases can also occur (e.g. **5-methylcytosine**, **5-hydroxymethylcytosine**,...). The pyrimidine derivative is also barbituric acid, whose derivatives have sedative effects.

Pyrimidine is also part of vitamin B₁ and of course **purine**.

Links

Related Articles

- Disorders of pyrimidine metabolism
- Nucleotide Metabolism

External links

- Pyrimidine - Wikipedia (<https://cs.wikipedia.org/wiki/Pyrimidine%7C>)
- Purines and Pyrimidines, Department of Chemistry, University of Maine (<http://chemistry.umeche.maine.edu/C/HY431/Basics/PurPyrm.html%7C>)

Resources

- MATOUŠ, Bohuslav, et al. *Basics of medical chemistry and biochemistry*. 1. edition. Prague : Galen, 2010. 540 pp. pp. 44. ISBN 978-80-7262-702-8.
- MURRAY, Robert Kincaid – BENDER, David A – BOTHAM, Kathleen M, et al. *Harper's Illustrated Biochemistry*. 5. edition. Prague : Galen, 2012. 730 pp. pp. 307. ISBN 978-80-7262-907-7.
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