Product Code: MD04977  
CAS Number: 533-67-5  
Chemical Formula: C₅H₁₀O₄  
Molecular Weight: 134.13

Synonyms: 2-Deoxy-D-arabinose  
2-Deoxy-D-erythropentose

2-Deoxy-D-ribose is an incredibly important molecule in biology, appearing in the four nucleoside units which as their phosphorylated variants (nucleotides) constitute DNA, Scheme 1. The C-1 carbon of 2-deoxy-D-ribose is bound to the N-1 nitrogen atom of the purine bases guanine and adenine, or the pyrimidine bases thymine or cytosine, with the N-glycosidic linkage having the β-configuration.

![Chemical Structures](image)

**Scheme 1**

2-Deoxy-D-ribose has been used in a new approach to the conformationally locked bicyclo[3.1.0]hexane framework of intermediate 1, Scheme 2, a key building block of the antiviral nucleoside North-methanocarbathymidine (N-MCT).¹ N-MCT, as the 5'-triphosphate nucleotide, inhibits viral DNA synthesis, and is efficacious against orthopoxviruses² and Kaposi’s sarcoma-associated herpesvirus.³

![Scheme 2](image)

**Scheme 2**

2-Deoxy-D-ribose finds utility in synthetic organic chemistry, for example it has been used in the mild synthesis of optically active dipyrrolyl alkanols from pyrroles or indoles on the surface of montmorillonite KSF clay, Scheme 3.⁴ Dipyrrolyl alkanols are building blocks used in the synthesis of meso-substituted porphyrins and porphyrinoid macrocycles.⁴⁵
Zakrzewski and Cheuk have utilised 2-deoxy-D-ribose in a synthesis of the four diastereomeric syn- and anti-3,5-dihydroxy-6-heptenoates; one of which is depicted in Scheme 4. These enantiomerically pure intermediates form useful intermediates for the synthesis of polyols. 2-Deoxy-D-ribose has even been used in a short and efficient synthesis of the enantiomer, 2-deoxy-L-ribose, in a sequence which complements previously reported routes such as the eight-step synthesis from L-ascorbic acid.

Uses in natural product synthesis have also been disclosed, for example Sasaki and co-workers have synthesized the polycyclic ether natural product (-)-brevenal in a lengthy sequence from 2-deoxy-D-ribose, and Holmes and Burton have reported its use in the formal synthesis of the medium ring ether ent-obtusenylene. (+)-Trachyspic acid (Scheme 5) and its enantiomer have both been synthesized from 2-deoxy-D-ribose as a common building block, and assessed for inhibitory activity against heparanase, an enzyme which degrades polymeric heparin sulphate to shorter chain oligosaccharides.

References: