L-Sorbose belongs to the L-series of natural sugars and has a sweetness equivalent to sucrose. L-Sorbose exists in equilibrium between its open keto form and any of two pyranose and two furanose forms (Fig. 1). There have been reported contrasting studies leading to some debate about its relative adoption of these forms. Control of the conditions allows manipulation of the thermodynamic and kinetic stabilities of these conformers to give a number of useful synthetic building blocks.

![Diagram of L-Sorbose chemical structure]

L-Sorbose is produced from D-Sorbitol by *Gluconobacter oxydans* or *Acetobacter* species via regiocontrolled dehydrogenation. This microbial oxidation is employed during the Reichstein process for the production of vitamin C (Fig. 2) where the L-sorbose provides the necessary stereochemistry for further chemical synthesis.

![Diagram of Reichstein process]

From this process the protection of L-Sorbose with Acetone provides a useful building block for chemical synthesis, leaving the 1-hydroxy group free for functionalisation via alkylation or esterification (Fig. 3). The hydroxyl group can also be oxidised to an aldehyde, granting access to approaches such as Wittig or Baylis Hillman. Hence, this useful intermediate has been employed in a number of total syntheses. Further oxidation to the carboxylic acid allows the formation of amides and esters.
The open form of L-Sorbose has been converted to an imidazole derivative which was found to have an inhibitory effect in a number of glycoprocesses\(^9\) (Fig. 4).

L-sorbose is also used as a precursor for the synthesis of other rare sugars such as L-tagatose\(^2\) and L-iditol\(^3\). L-Sorbose has also been applied to microbial culture media where it has been observed to alter the growth rate of fungi\(^4\).

References: