A Novel Study on Lactose Intolerance: The Correlation between the Chirality of Isomer D-Lactose and Observed Rotation of Polarized Light

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Lactose intolerance is seen by many as an inevitable part of life. And many people resign themselves to suffer through symptoms such as diarrhea, abdominal pain, nausea, flatulence, and bloating or are entirely dependent on lactase pills for the rest of their lives. This is because lactose normally causes the production of hydrogen gas, which causes many of the symptoms of lactose intolerance. But there may be an alternative solution. The aim is to prove that by changing the angle of rotation in the structure of d-lactose, the gut bacteria may be fooled into properly digesting the modified lactose. In this project, d-lactose has been rotated 28.9 degrees to form a modified version of lactose using high temperature and pressure. Trials were conducted at timed intervals to measure the angle of rotation in relation to length of heating time. A polarimeter was able to track the observed rotation of polarized light through the sample cell during each trial. The results show that gut bacteria E.coli B reacts to this rotated isomer of lactose with significantly less gas production, nearly two thirds less than normal lactose. In fact, d-lactose produced an average of 4.11 kPa of gas pressure, whereas modified lactose produced an average of 1.32 kPa, only 32.11% of the gas produced normally. This has great implications for the future of new dairy products with modified d-lactose and could subsequently reduce the symptoms and side effects that result from ingesting these products.

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