California Science Center

CALIFORNIA STATE SCIENCE FAIR
2001 PROJECT SUMMARY

Your Name (List all student names if multiple authors.)
Akriti Bhambi

Project Title (Limit: 120 characters. Those beyond 120 will be ignored. See pg. 9)
Lactase... Sweet... Lactase !

Science Fair Use Only

J0303

Division
J Junior (6-8) J Senior (9-12)

Preferred Category (See page 5 for descriptions.)
3 - Biochemistry / Molecular Biology

Abstract (Include Objective, Methods, Results, Conclusion. See samples on page 14.)
Use no attachments. Only text inside these boxes will be used for category assignment or given to your judges.

Objective: To see the activity of aspartame and saccharin on the lactase reaction.

Materials and Methods: Five buffers were made for various reasons. One was the basic reaction buffer, used to stabilize the reaction; the next was a substrate diluent into which the substrate, O-nitrophenyl galactoside (ONPG), would later be mixed with. Another was the enzyme diluent, to stabilize the enzyme, lactase. Following was the enzyme solution where the enzyme buffer was later mixed. Finally, a mercaptoethanol buffer was used as a reducing agent for the reaction. Then, 5.5 millimolar solutions of saccharin and aspartame were created with the chemicals and water. To read the reaction, water, the mercaptoethanol, ONPG, and the enzyme solution/buffer were mixed right after the spectrophotometer was set at 405 nanometers and the blank (the solution without enzyme) was read. After the control (the mixture without any inhibitors and/or activators) was read, the saccharin and aspartame were separately added and read. 11 millimolar solutions of saccharin and aspartame were made and read with the other ingredients (excluding water).

Results: In 5.5 milliMolar (mMol) solutions, Saccharin had a 3% difference from the last average reading of the Control, whereas Aspartame had a 28% difference. In 11 mMol solutions, Saccharin had a 12% gap from the Control and Aspartame totaled a 35% decrease.

Conclusion: My conclusion is that my hypothesis that both non-nutritive sweeteners would have a non-competitive inhibitory affect on the hydrolysis was mostly accepted. Both Saccharin and Aspartame's structures are completely different from ONPG's proving that the inhibition cannot be competitive. Despite that, Saccharin's readings were far too close to the Control's to call it an inhibitor; its affect was more like retardation of the reaction. Aspartame on the other hand, completely showed enough of a distance from the Control's readings to label it an inhibitor.

Summary Statement (In one sentence, state what your project is about.)
To see the effect of artificial sweeteners on the activity of the enzyme lactase.

Help Received in Doing Project (e.g. Mother helped type report; Neighbor helped wire board; Used lab equipment at university X under the supervision of Dr. Y; Participant in NSF Young Scholars Program) See Display Regulation #8 on page 4.
Supervised lab work at CAL-STATE UNIV., BAKERSFIELD BY DR. ROY LAFEVER.