The Effects of Lead on Beta-galactosidase Activity

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The carbohydrate in dairy products consists of a unique disaccharide called lactose. One lactose molecule is composed of a glucose molecule and a galactose molecule fused by a glycoside bond. In order for lactose to be digested and used for respiration, the sugar requires a specific enzyme for its hydrolysis that exists in organisms as primitive as bacteria. This bond can be degraded or broken into its component sugars in the small intestine by an enzyme called Beta-galactosidase or lactase. In this research, lead (II) nitrate was tested to determine its effect on Beta-galactosidase activity. Solution consisting of a buffer, 0-bitrophenyl-Beta-D-galactopyranoside (ONPG), lactase enzyme solution, and sodium carbonate were combined and absorbance was measured using the Spec 20, the presence of o-nitrophenol was detected by an increase in absorbance. The lead (II) nitrate contamination was tested in the same manner but by substituting lead (II) nitrate in place of portions of the 3.5 ml of buffer. In the control group, which contained no lead, the absorbance increased from 0 to 0.62. When 0.00001 M lead (II) nitrate was present, the absorbance increased from 0 to a maximum of 1.05. All concentrations (0.5ml, 1.0ml, and 1.5ml) increased in absorbance. This trend was also observed in the 0.0001 M groups and the 0.001 M groups. Using an ANOVA test, the presence of lead (II) nitrate caused a change in the reaction indicated by a change in absorbance at a statistically significant level. In conclusion the lead (II) nitrate enhanced the reaction.