Investigating How Temperature Affects the Rate of Decomposition of Hydrogen Peroxide in the Presence of Catalase

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Hydrogen peroxide is a harmful oxidizing agent produced as a side product of the metabolism of many organisms. Catalase is an enzyme which occurs naturally in these organisms to facilitate the breakdown of hydrogen peroxide into water and oxygen. The aim of this investigation was to determine an experimental relationship between temperature and rate of decomposition of hydrogen peroxide in the presence of catalase. Hydrogen peroxide solution and raw potato cubes containing catalase were kept in a sealed reaction vessel in which the investigated reaction would occur. The rate at which pressure inside the sealed vessel was increasing was monitored with a pressure sensor and further used to estimate the rate at which hydrogen peroxide was decomposing. Data was collected at 6 different temperatures ranging from 18-62°C. The reaction rate was found to be increasing between temperatures 18-34°C, after which the rate decreased slightly between 34° and 52°C. A large decline in the reaction rate was noted at 62°C. The study showed that increasing the temperature will increase the reaction rate up until a given optimum temperature between 34°C and 42°C. The reaction rate will fall when the temperature exceeds this value. Finetuning the experimental design could help narrow down the optimum temperature for the decomposition of hydrogen peroxide in potatoes. A similar experimental design could be used to find the optimum temperatures for the investigated reaction in a range of organisms.

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