Oksidasi kolesterol secara enzimatis oleh ekstrak kasar enzim dan enzim komersial kolesterol oksidase hasil fermentasi streptomyces sp. = Enzymatic oxidation of crude extract and commercial cholesterol oxidase from streptomyces sp.

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Abstrak

Enzim kolesterol oksidase adalah enzim oksidoreduktase yang mampu mendegradasi kolesterol. Pada percobaan ini, dilakukan produksi enzim kolesterol oksidase oleh Streptomyces sp. melalui fermentasi submerged lalu dilakukan investigasi terhadap aktivitas dan kemampuan katalisis enzim kolesterol oksidase. Pada percobaan, substrat dan enzim divariasikan pada berbagai konsentrasi, yaitu 0,15, 0,075, dan 0,0375 U/mL dan 1,25, 2,5, dan 5 mg/mL. Perbandingan konstanta laju reaksi antara ekstrak kasar enzim dan enzim komersial diperoleh dari hasil penelitian. Perbandingan konstanta laju reaksi enzimatis oleh faktor yang mempengaruhi, diantaranya imobilisasi enzim dan suhu inkubasi enzim, dengan data yang diperoleh dari literatur. Enzim dan substrat mengalami reaksi oksidasi pada waktu inkubasi 5, 30, 65, 120, dan 240, lalu konsentrasi kolesterol residu pada sampel dilakukan plotting dengan waktu inkubasi, dan konstanta laju reaksi diperoleh melalui permodelan reaksi orde 1 dengan pendekatan integrasi numerik Euler. Aktivitas ekstrak kasar enzim yaitu 1,69 U/mL dengan konstanta laju reaksi yaitu 0,01/menit untuk ekstrak kasar enzim dan 0,014/menit untuk enzim komersial. Selanjutnya, diperoleh faktor yang mempengaruhi konstanta laju reaksi oksidasi kolesterol secara enzimatik oleh enzim kolesterol oksidase, yaitu konsentrasi enzim, jenis enzim, imobilisasi, dan suhu inkubasi. Reaksi oksidasi kolesterol oleh enzim kolesterol oksidase dari Streptomyces sp. mengikuti reaksi orde 1.

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Cholesterol oxidase well known as oxidoreductase enzyme which able to degrade the cholesterol. Here, we produced cholesterol oxidase from Streptomyces sp. by submerged fermentation and investigate the activity and cholesterol oxidation kinetics of cholesterol oxidase. The enzyme and substrate are diluted in various concentration, 0.15, 0.075, 0.0375 U mL and 1.25, 2.5, 5 mg mL, respectively. Further step was comparing crude enzyme and commercial enzyme from Streptomyces sp. by oxidation constant rate of reaction. The enzyme and substrate were through the oxidation reaction, and the amount of cholesterol residue in the sample are determined by HPLC. In this work, we also compared the oxidation constant rate of reaction of previous experiment from literature with affecting factors, such as immobilization and incubating temperature. The cholesterol residue in the sample are plotted by time reaction and the rate constant is obtained by first order rate reaction using Euler integration method. The crude enzyme activity is 1.69 U mL and the reaction constant are 0.01 U mL and 0.014 for crude extract and commercial enzyme, respectively. Furthermore, several factors affecting constant rate of enzymatic oxidation of cholesterol were enzyme concentration, enzyme type, immobilization, and incubating temperature. Cholesterol oxidation by Streptomyces sp. cholesterol oxidase was follow the first order reaction.