

ABSTRACT

Farah Hanifia Indriawati. 24020221140083. **Immobilization of Cephalosporin C Acylase Enzyme Through Cross-linked Enzyme Aggregates (CLEA) Technique with the Addition of Aminosilanized Magnetic Nanoparticles.** Under the guidance of Sri Pujiyanto dan Ahmad Wibisana.

Cephalosporin C Acylase (CCA) is one of the enzymes used to produce 7-Aminocephalosporanic Acid (7-ACA) compounds which act as the main precursors for making cephalosporin-derived antibiotics. The Cross-linked Enzyme Aggregates (CLEA) enzyme immobilization technique is one of the techniques used to produce 7-ACA compounds because of its ability to increase the stability of free CCA enzymes in extreme environmental conditions, and allows the enzyme to be used repeatedly. CCA enzyme aggregates are formed from the cross-linking reaction of amino groups of lysine residues on the enzyme surface with aldehyde groups in glutaraldehyde (GA). The CCA enzyme immobilization process in this study was carried out by adding Bovine Serum Albumin (BSA) as a coaggregate and Aminosilanized Magnetic Nanoparticles (AMN) to increase stability and facilitate the process of separating enzymes with their magnetic properties. This study was conducted to determine the potential of AMN addition to CCA enzyme immobilization, which was analyzed by comparing the activity of mCLEA-CCA and CLEA-CCA through the immobilization yield and expressed activity values, and to determine the effect of AMN addition concentration (10-50 mg/mL), BSA coaggregate concentration (5-25%), and variations in glutaraldehyde (GA) concentration (0.0625-1%) as a cross-linker on the CLEA synthesis process. The study was also conducted to determine the optimum pH and temperature of the enzyme, as well as the stability of mCLEA-CCA, CLEA-CCA, and free CCA enzymes to pH and temperature. The immobilization process generally has two stages, namely enzyme precipitation using ammonium sulfate and cross-linking using GA. The results of the study showed that enzyme immobilization with the addition of AMN (mCLEA-CCA) has better potential than CLEA-CCA in increasing enzyme activity, with its ability to immobilize >95% of free CCA enzymes, and maintain the enzyme to remain active with optimal conditions at a concentration of 10% BSA (187.79%) and 0.25% GA (160.50%). In addition, mCLEA-CCA showed better pH and temperature stability than CLEA-CCA and free CCA enzymes, with optimum conditions at pH 9 and a temperature of 45°C.

Keywords: AMN, Cephalosporin C Acylase (CCA), CLEA, Glutaraldehyde (GA), mCLEA