

## **Covalent immobilization of cyclodextrin glucanotransferase on kenaf cellulose nanofiber and its application in ultrafiltration membrane system**

### **ABSTRACT**

Cellulose nanofiber (CNF) from kenaf bast fiber has potential to be used in enzyme immobilization. This study discloses the preparation of CNF, immobilization of cyclodextrin glucanotransferase (CGTase) on CNF via chemical coupling and its application using ultrafiltration membrane. Morphological analysis shows the diameter distribution of CNF in nano-order scale (<100. nm), which upon higher ultrasonication output power resulted in smaller size of CNF. FTIR analysis confirms successful immobilization of CGTase on CNF through spacer arm-ligand interaction. The efficiency of immobilized CGTase shows more than 62% of binding yield and more than 45% of its residual activity were obtained. Reusability profile of immobilized CGTase that fouled on the surface of membrane could retain up to 50-60% of CGTase activity at 10th cycle. This study reveals the successful of CGTase immobilization on CNF via covalent binding. A novel approach technique in the application of ultrafiltration membrane was disclosed, which is beneficial to the industrial biocatalyst due to its excellent enzymatic performance and it is able to be reused for multiple times.

**Keyword:** Kenaf cellulose nanofiber(CNF); Covalent immobilization; Cyclodextrin glucanotransferase(CGTase); Fouling operation; Ultrafiltration membrane