Immobilized bacterial biosensor for rapid and effective monitoring of acute toxicity in water

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Abstract	The use of biosensors by using microorganisms such as bacteria have short life cycles and provide other advantages. One colorimetric biosensor technique that has been developed is the use of a biosensor utilizing the incorporation of Prussian blue formation reactions mediated by E. coli bioreactors with ferricyanide. Immobilization is a method that allows the bacteria can be used for long-term without reducing its ability as bioreceptor. This study aimed to develop a novel and rapid immobilized bacterial biosensor for the detection of toxic compound in water and to evaluate their analytical performances. Immobilization of E. coil performed by trapping method using alginate material support. The bacterial suspension was mixed with sodium alginate (1:1 v/v), and the mixture was continuously dropped in CaCl2 solution to be a form of beads. The beads were used as bioreceptor to detect toxicants regarding cadmium, arsenic, mercury, chromium and lead solutions with Prussian blue as a colorimetric indicator. The linearity and sensitivity of detection of beads to the toxicants were tested, the stability of repeated use and storage were evaluated as well. The results showed that E. coil could be immobilized using alginate with response value was correlated with toxic concentration. The developed biosensor was more stable when used repeatedly and could be stored in a long time. The immobilization of E. coil in calcium alginate bead was successfully performed as a biosensor system for monitoring acute toxicity in water.
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