OPTIMIZATION OF DEVULCANIZATION PROCESS OF WASTE RUBBER PRODUCT BY *THIOBACILLUS FERROOXIDANS*

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Vulcanized rubber is one of the most huge and serious waste product sources in Malaysia. The present data on rubber waste shows that the rubber wastes consist of mainly scrap tires. With a large percentage of 65% of the total annual production of rubber, waste tire is one of the most significant environmental and waste storage problems. On top of that, the waste tire creates large fire and safety problems for those that live in the surrounding area of these stockpiles. Devulcanization is one of the methods that come into consideration. The process of devulcanization involves treating rubber in granular form with devulcanizing agents in order to produce reclaim rubber, a type of recycled rubber that can be added to virgin rubber or remolded into other products. Devulcanization has the advantage of making the rubber suitable for being reformulated and recurred into new rubber articles to produce reclaimed rubber, if it can be carried out without degradation of the rubber. In other words, the rubber could again be used for its original intended purpose. However, none of the devulcanization techniques previously developed have proven to be commercially practical. This project emphasizes on enzymatic devulcanization approach. *Thiobacillus ferrooxidans*, a tetrathionate hydrolase releasing bacteria will be used in this project to devulcanize rubber crumbs made from waste rubber tyre. Compared to other means of devulcanization, the use of biotreatment provides a process and product which can be operated on an economical basis at a commercial scale since the biological organism itself is a renewable, regenerating resource. Enzymatic devulcanization also does not result in the production of environmentally unacceptable waste products or emissions.

Keywords: devulcanization, Thiobacillus ferrooxidans, tetrathionate hydrolase, optimization, rubber waste.