

Assessing Storage of Stability and Mercury Reduction of Freeze-Dried *Pseudomonas putida* within Different Types of Lyoprotectant

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petrochemical industry due to its mercury reductase enzyme that able to reduce ionic mercury to elementary mercury. Freeze-dried *P. putida* allows easy, inexpensive shipping, handling and high stability of the product. This study was aimed to freeze dry *P. putida* cells with addition of lyoprotectant. Lyoprotectant was added into the cells suspension prior to freezing. Dried *P. putida* obtained was then mixed with synthetic mercury. Viability of recovery *P. putida* after freeze dry was significantly influenced by the type of lyoprotectant. Among the lyoprotectants, tween 80/ sucrose was found to be the best lyoprotectant. Sucrose was able to recover more than 78% ($6.2E+09$ CFU/ml) of the original cells ($7.90E+09$ CFU/ml) after freeze dry and able to retain $5.40E+05$ viable cells after 4 weeks storage at 4 °C without vacuum. Polyethylene glycol (PEG) pre-treated freeze dried cells and broth pre-treated freeze dried cells after the freeze-dry process recovered more than 64% ($5.0 E+09$ CFU/ml) and >0.1% ($5.60E+07$ CFU/ml). Freeze-dried *P. putida* cells in PEG and broth cannot survive after 4 weeks storage. Freeze dry also does not really change the pattern of growth *P. putida* but extension of lag time was found 1 hour after 3 weeks of storage. Additional time was required for freeze-dried *P. putida* cells to recover before introducing freeze-dried cells to more complicated condition such as mercury solution. The maximum mercury reduction of PEG pre-treated freeze-dried cells after freeze dry and after storage of 3 weeks was 17.91 %.The maximum of mercury reduction of tween 80/sucrose pre-treated freeze-dried cells after freeze dry and after storage 3 weeks was 25.03%. Freeze dried *P. putida* was found to have lower mercury reduction compare to the fresh *P. putida* that has been grown in agar. Result from this study may be beneficial and useful as initial reference before commercialized freeze-dried *P. putida*.