

CHAPTER 5

CONCLUSION

Biodegradation of phenol by *C. tropicalis* CMU 10 isolated from a soil sample was reported. The experiments started with investigation of physical factors (temperature, pH and phenol concentration) and nutritional factors (glucose, organic acids and metal ions) on phenol degradation and followed by phenol degradation using agar- and alginate-immobilized cells. The results can be summarized as follows:

C. tropicalis CMU 10 was able to degrade phenol in a mineral salts medium containing 100 mg/l phenol in a relatively wide temperature range of 20-42°C. The optimal temperature was 37 °C. Maximum initial concentration of phenol utilized was 1,000 mg/l and the optimum pH was 8. The yeast strain could degrade phenol completely in the presence of 0-5 mM glucose, 10 mM organic acids (citric, lactic and succinic) and 0.4 mM metal ions (Fe^{2+} , Fe^{3+} , Mn^{2+} and Zn^{2+}) in 4-8, 4-7 and 4-6 days, respectively.

The degradation of phenol was enhanced using the immobilized cells of *C. tropicalis* CMU 10. Through immobilization, the yeast could tolerate phenol at

high concentration up to 2,500 mg/l. In addition, the multiple reuse of the immobilized cell beads was also possible. Phenol was completely degraded after 4, 7 and 5 sequential batches by free cells and alginate- and agar-immobilized cells after 246, 432 and 1,578 h, respectively. The maximum phenol degradation rates of free and immobilized cells in alginate and agar matrices were 41.6, 34.9 and 26.0 mg/ l-h, respectively with 1,250 mg/l initial phenol concentration. Therefore, it was shown that immobilized cells could degrade phenol at higher concentration than that of the free cells (2,000 and 2,750 mg/l for agar- and alginate-immobilized cells, respectively).

Therefore, the immobilization of *C. tropicalis* CMU 10 in alginate and agar beads was effective in the treatment of industrial effluents containing phenol at high concentration. The yeast could serve as a potential candidate for environmental pollution control.