CHAPTER VI

DEGRADATION OF VARIOUS HALOGENATED AROMATICS BY BACTERIAL CONSORTIUM
Degradation of various halogenated aromatics by bacterial consortium

The results of our studies on the utilization of various halogenated aromatics by the bacterial consortium consisting of mixed *Pseudomonas* species are presented and discussed in this chapter.

RESULTS AND DISCUSSION:

The bacterial consortium consisting of four bacterial strains namely *Pseudomonas aeruginosa* PA01 NC, *Pseudomonas aeruginosa* AY792969, *Pseudomonas* sp. ZZ5 DQ113452 and *Pseudomonas* sp. AY762360 was prepared and inoculated in Erlenmeyer flasks containing 100ml of the mineral salts medium supplemented with varying concentrations of different halogenated aromatics. Each of the flasks was also supplemented with 0.05% yeast extract. Since yeast extracts, vitamins and trace elements could significantly enhance the aerobic degradation rate of chlorobenzoic acid isomers (Armenante *et al.*, 1995; Faral *et al.*, 1995). The flasks were incubated at room temperature on a rotary shaker at 150 rpm.

The utilization of these halogenated aromatics during the growth of the bacterial consortium was measured at different incubation periods by extraction with diethylether and followed by quantitative spectrophotometric analysis. The disappearance of 4-chlorobenzoic acid and 2-chlorobenzoic acid was estimated by monitoring the absorbance at 236nm and that of o-dichlorobenzene and p-dichlorobenzene at 269nm and 272nm respectively. The utilization of different halogenated aromatics at different concentrations by the bacterial consortium is shown in Fig.VI.1, VI.2, VI.3 and VI.4. There was a complete utilization of 4-chlorobenzoic acid and 2-chlorobenzoic acid at the concentration of 0.5% (w/v) within 4 days of incubation periods. However the utilization of 4-CB and 2-CB declined at concentrations higher than 0.5%. There was complete utilization of
Fig. VI.1. Degradation of 4-chlorobenzoic acid (○○) at varied concentrations by bacterial consortium. Uninoculated control (−−)
Fig. VI.2. Degradation of 2-chlorobenzoic acid (●-●) at varied concentrations by bacterial consortium. Uninoculated control (-*- -*)
Fig. VI.3. Degradation of o-dichlorobenzene (●●) at varied concentrations by bacterial consortium. Uninoculated control (-*-)
Fig. VI.4. Degradation of p-dichlorobenzene (●●) at varied concentrations by bacterial consortium. Uninoculated control (-*-).
o-DCB at the concentration of 0.5% (v/v) within 6 days of incubation periods and that of p-DCB at the concentration of 0.4% (v/v) within 7 days of incubation periods, beyond these concentrations no complete utilization of these halogenated aromatic compounds was observed. Thus, the bacterial consortium utilized higher concentrations of these toxic chemicals compared to the cells of a single isolate which utilized the toxic chemicals namely 4-chlorobenzoic acid and 2-chlorobenzoic acid only upto a concentration of 0.2% (Table IV.1 & V.1).