

# **Role of Interfacial Reactions in Biodegradation: A Case Study in a Montmorillonite, *Pseudomonas Putida* and Methyl Parathion Ternary System**

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Organophosphate pesticides are of great interest for research because they are currently the most commonly used pesticides. In this study, we constructed a ternary biodegradation system containing methyl parathion (MP), a bacterial strain of *Pseudomonas* sp. Z1 with capability of using MP as sole carbon source and montmorillonite. The role of interfacial reactions between montmorillonite and the MP degrader (*P. putida*) on biodegradation was investigated by batch adsorption as well as a semipermeable membrane experiments, and the contact between degrader and montmorillonite in biodegradation was dynamically examined using in situ attenuated total reflectance Fourier transform infrared spectroscopy (ATR-FTIR) and the Metabolic activity of degrading bacteria was also analyzed by isothermal microcalorimetric technique. The results indicated that both MP and the bacterial cells could be sorbed on montmorillonite in the biodegradation process of MP. The sorbed MP can also be degraded by bacteria. The amide group of protein on the bacterial surface could be involved in the contact with montmorillonite, which significantly promoted the bacterial metabolic activity and hence the degradation of MP. This stimulated effect was disappeared when the bacteria were separated from the surface of the mineral.

Keywords: Interfacial reactions; Biodegradation; Ternary system