

Microbes to degrade organic pollutants

Scientists at the Institute of Microbial Technology (IMTECH), India, have identified useful micro-organisms that can degrade two very harmful and persistent classes of pollutants. These microbes can be used as an eco-friendly alternative to chemical degradation. Researchers have isolated several microbes that could biologically degrade hazardous hydrocarbons such as nitro-aromatic compounds and polycyclic aromatic hydrocarbons (PAHs) and convert them into harmless substances. Both these groups of compounds are highly toxic and even cause genetic mutations.

The main focus is on para-nitrophenol (PNP), a major pollutant used in some explosives and pesticides. It is released into the environment by chemicals, dye and paint industries. Nitrophenols belong to the nitro-aromatic group which also includes nitrotoluene and nitrobenzene compounds. They are used worldwide as explosives and pesticides, and as building blocks for dyes, pharmaceuticals and plastics.

IMTECH researchers have isolated and characterized at least three micro-organisms which can utilize nitro-aromatics such as PNP, orthonitrobenzoate and para-nitrocatechol as the sole source of carbon and energy. The team has also identified several micro-organisms that can degrade PAHs such as naphthalene and phenanthrene, common environmental pollutants that can cause gene mutations and cancers. These compounds are universal combustion products and common in petroleum, coal refining, automobile exhaust and forest fires. Naphthalene and phenanthrene are used to manufacture pesticides, detergents, dyes and other petro products.

The new microbes have been isolated and genes coding for the complete degradation of harmful hydrocarbons cloned. Now, researchers are striving to genetically engineer other micro-organisms to degrade PAHs by introducing these genes into them. (Chemical Weekly, 12 September 2000)