

## Enzymes involved

- The enzymes involved in biodegradation and bioremediation are usually coded for by genes present in plasmids of the organism
- Sometimes, degradation involves the cooperative working of products of chromosomal and plasmid genes

**TABLE 59.2 A selected list of xenobiotics and the plasmids containing genes for biodegradation**

<i>Xenobiotic</i>	<i>Name of plasmid in Pseudomonas</i>
Naphthalene	NAH
Xylene	XYL
Xylene and toluene	TOL, pWWO, XYL-K
Salicylate	SAL
Camphor	CAM
o-Chlorobenzene	pAC25

# Recalcitrant Xenobiotics

- Some compds do not easily undergo bioremediation and persist in the environment for a long period. These are known as recalcitrant xenobiotics

## Examples:

1. Halocarbons- compds containing different number of halogens in place of H( used as propellants for spray cans in cosmetics, paints, used in cooling system of condensers,, and in herbicides.)
2. PCBs- compds having covalently linked benzene rings and having halogen substitution for H(used in platicisers, insulator coolants in transformers)

3. Synthetic Polymers- produced as plastics, e.g., polyethylene, polystyrene, nylon garments, wrapping materials
4. Oil spills
5. Others: a number of pesticides are based on aliphatic, cyclic ring structures containing substitutions for halogens, nitro and sulphonate. This makes them recalcitrant

## Existence of Xenobiotics

- This maybe because:
  1. The compds are highly stable
  2. Lack of enzyme system in the organisms
  3. Lack of transport system in organisms. Hence they cannot enter the organisms
  4. Compds may be highly toxic resulting in the death of the organisms