

## Protecting the Environment

Over the medium term, the environment will likely derive great benefits from the advances being made in biotechnology. Already, it is possible to produce very effective bacteria to purify waste water and biologically degrade toxic waste.

### Use of micro-organisms to purify waste water

The biological processes used to purify waste water are based on the presence of bacteria that develop naturally. With or without oxygen, depending upon the process, these bacteria decompose the organic materials contained in the water and use them as a source of food. The residues are concentrated in the form of sludge, which is then ready for disposal.

Faced with an overload of organic materials, which often occurs in purification plants, ordinary bacteria cannot meet the challenge. However, a new process known as LLMO (Liquid Live Micro-Organism), which has already been approved in the United States, provides a remedy for the problem. Aquarecherche Ltd. of North Hatley, Quebec, has given the name of DACTAPUR to its version of the LLMO process. It was used for the first time in Canada during 1987 in the purification plant of the Municipality of Lac-Mégantic, Quebec.

This process is of considerable interest because it adds a mixture of non-pathogenic super-bacteria strains to the waste water. These can help service micro-organisms significantly reduce (in the order of 30 to 50 per cent) the volume of sludge produced during processing, while making the residues available for agricultural and forestry purposes. In addition, these super-bacteria digest fats and eliminate the problem of unpleasant odour in waste-water networks. Aquarecherche investigators have also been able to condition these bacteria so that they can degrade solvents and hydrocarbons.

Paques Lavalin of Willowdale, Ontario, a company very active in the environmental field, is especially interested in the anaerobic processing of waste water. This technology, which was imported from Holland, has made it possible to develop the BIOPAQ system, which can be used to process waste water while producing a biogas that can be used to replace conventional fuel in a plant. The anaerobic bacteria used in the BIOPAQ reactor digest up to 90 per cent of the biodegradable materials contained in waste water. Apart from waste-water processing plants, the BIOPAQ system can be used in various other industries, in par-

ticular pulp and paper, food products and beverages.

At the same time, it is clear that industrial effluents are very dangerous for the environment, particularly the aquatic environment and the water table. Industry is becoming increasingly aware of its role in protecting the environment and of the possibilities offered by biotechnological processes. Such is the case with the Bon-Conseil cheese-making plant, a Quebec subsidiary of Agropur. The plant dumps a volume of waste water equivalent to that produced by a population of 50 000 people.

Aware that agri-food effluents have been identified as a major pollutant, the company has distinguished itself by acquiring a waste-water processing centre that uses a mixed anaerobic-aerobic system. The initial decomposition of the polluting load is obtained by means of bacteria that act in a sealed chamber in the absence of air (anaerobic phase). The purification task is complemented by the activity of aerobic bacteria contained in outdoor tanks in the open air. The sludge produced by the process is used as a fertilizer for an experimental spruce nursery next door to the waste-water processing centre.

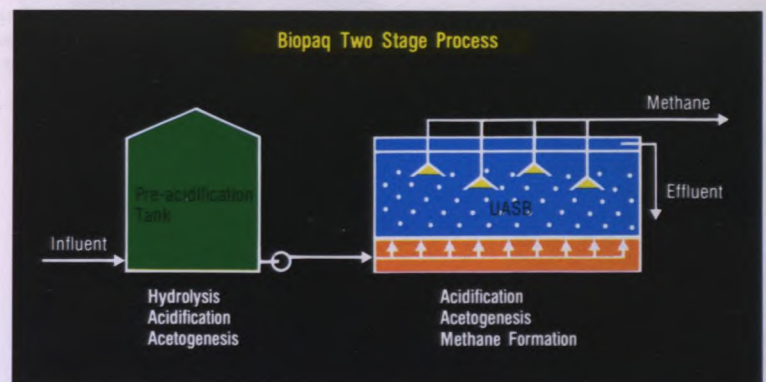


Illustration of the BIOPAQ system.  
(Paques Lavalin)