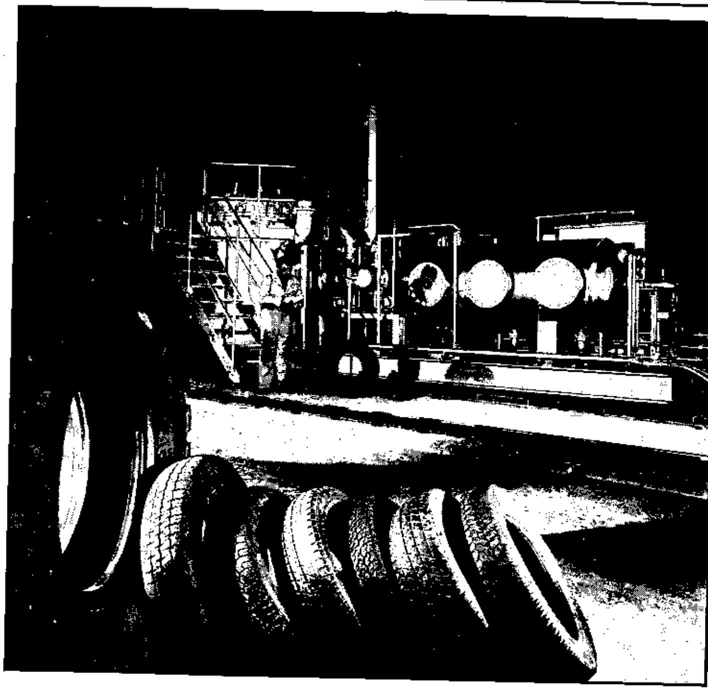
Processes



New use for old tyres

Car tyres could provide a cheap source of carbon for treating liquid effluents. A new pyrolysation process developed by two British companies, AEA Technology and Herbert Beven Ltd, produces a 97% pure carbon char as a by-product which can be used as a filter medium.

The pyrolysers chemically decompose tyres at high temperatures in an oxygen-free environment. Oil, gas and steel are also recovered. One tonne of tyres typically produces 200 kg of both oil and gas, 400 kg of carbon and 150 kg of steel. The oil and gas can be used to power the pyrolyser or run an adjacent combined heat and power system.

Each pyrolyser can dispose of 700 tonnes of tyres per year, and can be batched into systems of up to 20 units. Emissions of nitrogen and sulphur oxides are said to be lower than those of incinerators.

AEA-Beven has just negotiated a deal in the USA which will licence North American Tire Recycling Ltd to manufacture and market the design in the USA and Canada. The US has an estimated 3 billion old tyres stockpiled, and recent fires at dumps in the US and Canada which released oil into groundwater and hydrocarbons and dioxins into the air, have highlighted the environmental problems tyre dumps pose.

More from: AEA Technology, B329 Harwell Laboratory, Oxfordshire OX11 0RA, UK.

Yeasts remove metals

Yeasts are being used in a novel treatment process to remove heavy metals from industrial wastewaters.

Pilot studies have shown yeast to be an effective bioaccumulator for a wide variety of metals, and relatively efficient at removing chromium from tannery wastes.

Being a waste product from the baking and brewing industries, yeast is a cheap and readily available biomass. Researchers at Rhodes University in South Africa, where the pilot studies are being carried out, plan to investigate other industrial effluents and mining wastewaters with a view to scaling the process up to treatment plant size.

From: SA Waterbulletin, May/June 1992.

Pectin plant process cuts N and P

One of the biggest pectin factories in the world has upgraded its treatment plant to meet tough new regulations on nitrogen and phosphorus, so that it can discharge treated effluent straight into nearby coastal waters.

A/S Copenhagen Pectinfabrik of Denmark uses large amounts of ammonia and nitric acid to extract pectin and carrageen from raw materials. Kjeldahl nitrogen levels in the wastewater typically average 600 mg/l. Previously, the treatment plant used predenitrification to remove nitrates from the incoming water, an anaerobic stage to remove methane, and an aerobic stage to oxidize any remaining BOD. The treated effluent was then processed by the municipal treatment plant.

The upgraded plant installed by Swedish contractor Purac now has two nitrogen removal stages with simultaneous precipitation of phosphorus. Organic matter in the incoming water is used as a carbon source for the denitrification reaction. The nitrified water is then recirculated back to the denitrification stage.

Both parts of the nitrogen reduction stages have a denitrification and nitrification zone. Stage 1 has been designed to achieve 90% nitrogen reduction. Stage 2 limits inorganic nitrogen in the outgoing water to a maximum of 8 mg/l to meet the new regulation. As the carbon source in the effluent emerging from the anaerobic stage is limited, part of the incoming water is routed directly into the denitrification sections of the nitrogen reduction stages.

More from: Purac AB, Box 1146, S-221 05 Lund, Sweden.

Catalysis changes chemicals into profitable products

Chlorinated organics can be broken down into usable commercial products using a resource recovery system known as Catalytic Extraction Processing (CEP), claim its makers.

Molten Metal Technology, a US company, say the process involves retrograding chemical compounds to their original elements and then recombining them with other chemicals to produce new substances.

In the process, chemical intermediates are fed into a multiphase reactor which contains a liquid catalytic metal solvent, where they revert to elemental form. The efficiency of the reactions and the introduction of specific reactants allows selective combination to form new commercial products. Any non-commercial residues can be vitrified and landfilled.

Chlorinated wastes being poorly combustible are costly to dispose of, and risk forming dioxins and phenolic compounds if combustion is not carried out correctly. With CEP, the solution chemistry can be engineered to yield calcium chloride or anhydrous hydrochloric acid and various synthesis gases, given monochlorobenzene as an example feedstock. The synthesis gases can themselves be used to make methanol, ammonia and simple hydrocarbons, or burned to fuel the process.

Inorganic substances can also be treated by CEP, which takes wastes in solid, liquid or gaseous form. The manufacturers claim capital costs of the system are 25-50% lower than incinerators, with operating costs about 50% smaller. Processing capacities range from 5,000 - 150,000 tons per year, and generate no wastewaters or toxic waste gases.

From: Water and Wastewater International, August 1992.