PERTRACTION

Industrial pertraction installation

TNO innovation for life

Pertraction, coupled with a regeneration process, is both technically and economically attractive compared with competing conventional alternatives such as air stripping or activated carbon filtration. A full scale 15 m^3/hr pertraction installation has been in operation at an industrial site for more than 5 years. TNO has application and scale up know how available for many applications. New applications can be developed efficiently due to the available basic know how.

SUPPLY OF PERTRACTION INSTALLATIONS

In co-operation between BWS and TNO Science and Industry pertraction installations for industrial applications can be supplied now. An installation with a capacity of 15 m^3/hr has been in operation or more than 5 years. TNO has application and scale up know how available for many different applications. Based on this knowledge a first design and costs estimate can be made, optimised for variable and fixed costs.

New and special applications can be developed efficiently due to the available extensive basic know how.

PERTRACTION: AN EFFICIENT AND FLEXIBLE PROCESS

Process or waste water flows contaminated by organic substances such as aromatics or chlorinated hydrocarbons can be cleaned by pertraction. The pollutants are removed from the water by absorption into an organic extraction agent. The membrane forms the interface between the waste water and the extractant.
In the pertraction process, therefore, the extractant is not added directly to the waste water, as in a conventional extraction process. This offers important advantages over conventional extraction.

Mobile pertraction pilot plant ARKA

Table 1 Cost evaluation tricloroethene

Flow rate: 10 m^3/uur Trichloroethene inlet concentration 10,000 mg/l			
Out let concentration	Total costs in euro per m^3 treated water for the different selected processes		
	Air stripping; with air treatment	Activated carbon filtration	Pertraction
1000 µg/l	EUR 0.59	EUR 0.93	EUR 0.31
100 µg/l	EUR 0.59	EUR 0.99	EUR 0.40
10 µg/l	EUR 0.67	EUR 1.03	EUR 0.49
1 µg/l	EUR 0.67	EUR 1.04	EUR 0.56

It means that the often difficult and time consuming separation between water phase and extractant is not necessary. The flows of waste water and extractant are flexible, and can be adjusted independently of another, making process optimisation simple and allowing a highly efficient contact between a large volume of (waste) water and a very small quantity of extractant.

The pertraction installation can be of very compact construction, thanks to the high specific surface area and good mass transfer of the pertraction membrane modules.

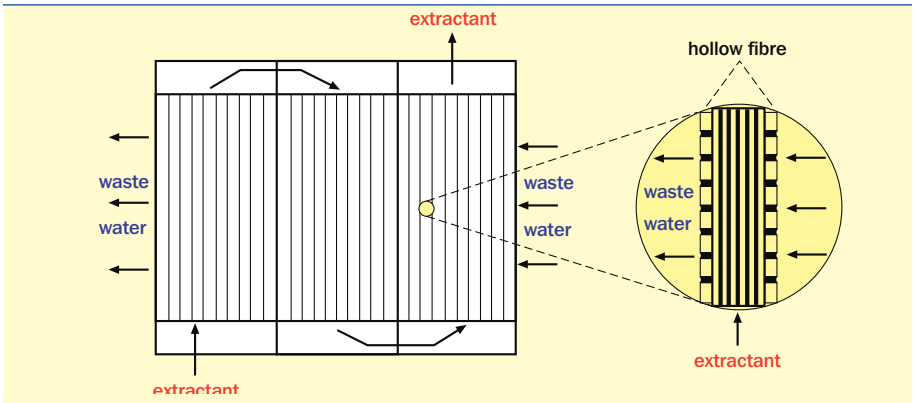
PERTRACTION: A COMPLETE PROCESS

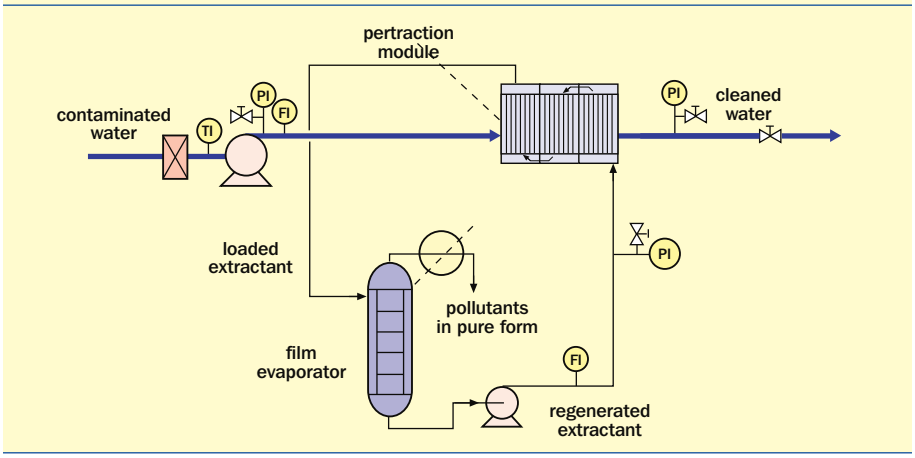
In the pertraction process, the pollutants are concentrated in the extractant. The latter can be regenerated in a vacuum film evaporator, and can thus continue to circulate in the system, while the pollutants are released in pure form.

PERTRACTION: AN ECONOMICALLY ATTRACTIVE PROCESS

Cost comparisons with existing techniques show the pertraction process to be highly attractive in economic terms. For trichloroethene, for example, pertraction is cheaper then the alternatives (air stripping or activated carbon filtration) in all the cases calculated. An example of a cost evaluation is shown in table 1.

Other substances which can be economically treated by pertraction include chlorinated solvents (e.g. carbon tetrachloride, chloroform, tetrachloroethene, trichloroethene), PCB's, di- and tri-chlorobenzene, pesticides and higher polycyclic hydrocarbons.





Experimental set-up for photocatalytic oxidation with solar energy

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