The recovery of solvents from waste liquid streams

Fact Sheet

Project Information

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Project closed

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31 December 1994

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Specific research and technological development programme (EEC) in the field of the environment, 1990-1994

Total cost
No data

EU contribution
No data

Coordinated by
EA TECHNOLOGY LTD.
United Kingdom

Objective

The work has been carried out to establish the technical and economic feasibility of recovering solvents from waste streams. The methods under consideration include heat pump assisted distillation and pervaporation for solvent recovery as well as any necessary pretreatment techniques, and computer modelling of solvent recovery techniques and hybrid distillation pervaporation systems. The current situation in the 3 participating countries (United Kingdom, Ireland and Portugal) was assessed in order to identify those industrial sectors producing significant volumes of waste solvent. The surveys showed that the pharmaceutical industry is a major producer of

waste solvent in all 3 countries. In the United Kingdom some solvent recovery is already carried out by this sector, although in most cases energy intensive processes are employed. No suitable treatment and disposal facilities exist and so the development of cost effective in house recovery techniques will be beneficial to a large number of companies. Preliminary experimental studies have concentrated on waste streams from the pharmaceutical industry. A distillation unit incorporating a steam compression system has been designed and constructed to run initially on mixtures of isopropanol (IPA) and water; such streams are commonplace in the pharmaceutical sector. IPA water mixtures are also ideal candidates for separation by pervaporation. With aqueous streams, however, pervaporation is most efficient for removing small amounts of water. Therefore, many waste solvent streams are likely to be suitable for separation using hybrid distillation pervaporation systems: distillation can be used to remove the bulk of the water and pervaporation employed to achieve the required degree of purity of the recovered solvent.
It is proposed to undertakè RTD to investigate and demonstrate the use of heat pump assisted distillation, pervaporation and a hybrid of the two to achieve effective, economic and energy efficient solvent recovery, With associated reductions in C02 emissions, from industrial liquid Waste streams. This research Will be realised through the following tasks:- (i) a survey of, present industrial users of Solvents, and future trends to clearly define the types of Waste stream to be
studied;
(ii) a quantitiative assessment of the range and characteristics of representative industrial waste streams; the need and method of pretreatment of the liquid stream to remove solid contaminants, and the most effective means of solvent recovery;
(iii) a quantitative investigation of the properties of the recovered solvents;
(iv) an experimental study, using model solvent mixtures to approximate the waste streams, of heat pump assisted distillation, and pervaporation, with particular regard to, identifying the appropriate regimes for effective operation of each technique and to obtaining fundamental physical and engineering data to permit scale up of the results;
(v) development of physical and process models to permit a systematic study of the heat pump distillation, pervaporation and a hybrid of the tW0 for complex solvent mixtures to establish the optimisation of such systems with regard to maximum solvent recovery, minimum energy and overall process costs;
(vi) on the basis of the results obtained, undertake a critical economic and technical assessment of the above techniaues to define their present and future potential.

It is anticipated that the successful completion of this Work Will provide a process which makes in-house solvent recovery economically attractive for small end users, and would have the effect of reducing the need for transportation and trans-frontier shipping of Wastes, and reduce the need for solvent production. - - '

Fields of science (EuroSciVoc)

Programme(s)

FP3-ENV 1C - Specific research and technological development programme (EEC) in the field of the environment, 1990-1994

Topic(s)

Data not available

Call for proposal

Data not available

Funding Scheme

CSC - Cost-sharing contracts

Coordinator

EA TECHNOLOGY LTD.

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