

FLOTATION AND MEMBRANE TREATMENT OF INDUSTRIAL WASTEWATERS

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INTRODUCTION

The treatment of industrial wastewaters by dissolved-air flotation, ultrafiltration and reverse osmosis to recover water and byproducts from the pollutants has been studied over a period of several years. The potential of by-product recovery as a means of defraying costs of pollution control measures, acts as an incentive for industry to install wastewater treatment plants.

THE MEAT INDUSTRY

Dissolved-air flotation has been successfully applied to precipitate proteins from the wastewater of red meat, pig and poultry abattoirs. However, the control of the process by unskilled staff causes instabilities in the operation with resulting variability in the efficiency of COD removal. Membrane techniques do not require such control and can readily accept screened abattoir effluent of varying organic strength.

FISHING INDUSTRY

The production of fishmeal, fish oils and canning produce very strong organic effluents. Flotation has proved successful on cannery effluents but the bloodwaters and any stickwater which escapes are not amenable to flotation without major doses of chemicals such as ferric chloride which degrades the recovered float, reducing its value as a byproduct. Ultrafiltration of bloodwaters and stickwater concentrate these otherwise-lost proteins and fats to concentrations suitable for recovery.

FRUIT AND VEGETABLE PROCESSING INDUSTRY

The major proportion of the organic and suspended solids concentration in the final wastewaters from the industry is resident in a relatively small proportion of the total wastewater flow; usually in the first three processing steps. Attention has been focused therefore on segregating these streams so that the dissolved-air flotation and membrane techniques can be applied to the minimum volumes.

As an example, the transportation of peach halves in flumes results in a rapid rise in COD due to leaching of fruit based substances, including sugars which stabilise at a concentration of about 0,7% total sugars.

Dissolved-air flotation can remove 50% of the COD and up to 80% of the SS in the final effluents resulting from processing most commodities, without chemical dosing. The quality of some of the float material produced, expressed as a percentage of dry mass, is as follows :

Commodity	Protein %	Ca %	P %	Fibre %
Apples	40,0	0,51	0,37	12,0
Carrots	9,0	1,12	0,74	15,5
Pears	7,8	0,72	0,16	38,0
Peaches	8,9	0,60	0,14	45,0

Accordingly the float material recovered from the DAF plant could find use as an additive in animal feeding compounding.

TANNING INDUSTRY

Settlement and dissolved air flotation is applied selectively to individual effluents arising from the wet-blue tanning process. The wet-blue effluent is made up of eight batch effluent fractions. Three of these fractions together contribute 70% of the total effluent COD but comprise only 40% of the total effluent volume. Another three fractions together constitute 95% of the primary suspended solids load, but only 40% of the total effluent volume. Another fraction contains 100% of the chrome discharged in only 12% of the total effluent volume.

By selective settlement, re-admixture of fractions to cause autoprecipitation of dissolved compounds, aeration and dissolved air flotation, an acceptable effluent for discharge into municipal sewers can be obtained.