Montreal Protocol

Process Agents Task Force

Case Study #4

Use of CTC in Endosulfan production

May 2001

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CS-4 Use of CTC in Endosulfan production

C-4.1 Introduction

Endosulfan is an organochlorine insecticide. It is a broad spectrum biodegradable insecticide - acaricide widely used in the control of pests in cotton and other crops.

There are three medium size manufacturers of Endosulfan in India; two of them are using CTC as solvent in their process. This report describes the process of one of the two CTC users but provides CTC consumption and emission levels for both the plants.

C-4.2 Endosulfan manufacturing process

HET DIOL is reacted with thionyl chloride with CTC as an inert solvent. During reaction HCl is formed which is scrubbed. After the reaction the mass is neutralised with alkali. This neutralised mas is then distilled to recover the CTC solvent which is recycled for the process. Molten Endosulfan mass is then flaked by cooling and flakes are packed as per requirement.

C-4.3 CTC consumption and emission

Total consumption of CTC for Endosulfan manufacture by the two producers in the year 1995 was 636 MT. Their production is expected to remain almost at the current level and CTC consumption in the year 2000 is estimated at 650 MT. The entire quantity of CTC represents consumption, as shown in the attached Table giving break up of annual recycle i.e., use and consumption in the Excel Industries process.

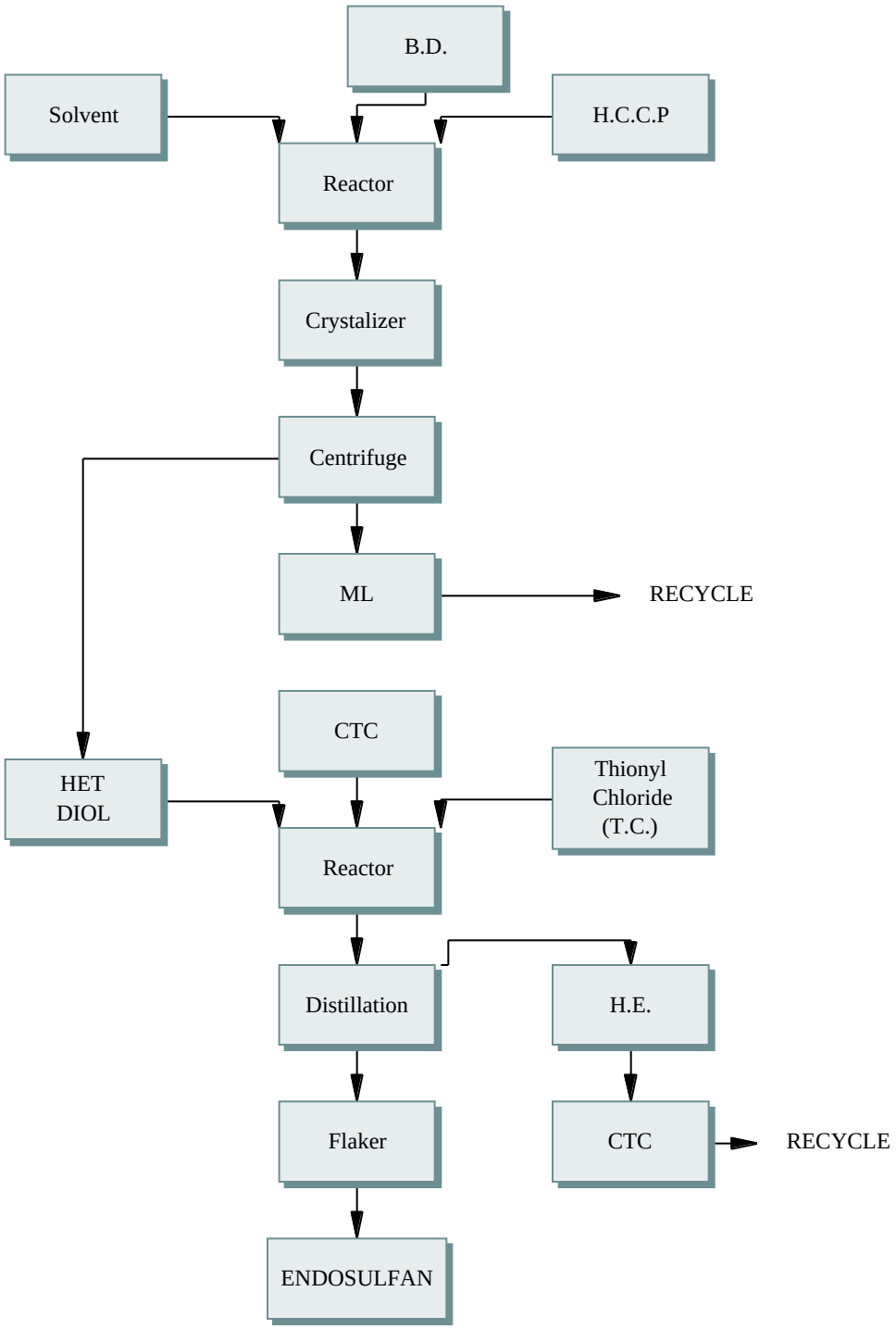
C-4.4 Conversion to use of non-ODS solvent

During the years 1993 and 1994, Excel tried out various solvents for Endosulfan reaction and concluded that Ethylene Dichloride can be used as a substitute solvent to produce Endosulfan upto international quality standards. In order to implement this change, some alterations in their equipment and plant operation are necessary to maintain the required production capacity and fulfil safety standards. The manufacturer claims that with assistance CTC consumption of 386 MT per annum can be phased-out.

The second producer of Endosulfan using CTC as solvent is also formulating plans to switch over to a substitute non-ODS solvent and may decide to choose an aromatic

solvent for this purpose. Such a solvent being highly inflammable, the cost of conversion in this second case would be higher than that of Excel.

C-4.5 Endosulpan production process



C-4.5.2 Material balance

Item Description	Units	Endosulfan Process
Annual Endosulphan Production	[t/a]	5,000
Annual CTC Recycle	[t/a]	8,375
CTC Recycled Per Production	[t/t]	1.675
Annual CTC Consumption	[t/a]	340
CTC consumed Per Production	[t/t]	0.068
Annual CTC Transformed/Destroyed	[t/a]	0.00
CTC Transformed/Destroyed	[%]	0.00
Annual CTC used as CPA	[t/a]	8,375
Annual CTC Emission	[t/a]	340
to atmosphere	[t/a]	340
to water	[t/a]	0.00
to product	[t/a]	0.00
Annual CTC Emission	[%]	100
CTC Emission Per Production	[t/t]	0.068
to atmosphere	[t/t]	0.068
to water	[t/t]	0.00
to product	[t/t]	0.00
CTC Emission Per Recycle	[t/t]	0.041