

Montreal Protocol



Process Agents Task Force

Case Study #5

Use and consumption of CTC in Ibuprofen production

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CS-5 Use and consumption of CTC in Ibuprofen production

C-5.1 Introduction

Isobutyl Acetophenone (Ibuprofen) is a basic drug which is used in the manufacture of analgaesic formulations for use as pain killers.

There are not less than 14 plants in India producing this basic drug; a few of them are of medium size while the rest are small scale producers.

C-5.2 Ibuprofen manufacturing process

Iso Butyl Benzene is reacted with acetyl chloride in presence of aluminium chloride catalyst with CTC as an inert solvent. By-product hydrochloric acid gas generated is scrubbed with water. The unreacted components like aluminium chloride are dissolved in water by quenching process and Iso Butyl Acetophenone is separated by difference in specific gravity. Iso Butyl Acetophenone, free of solvent is recovered by vacuum distillation. CTC, thus, recovered is recycled for the process.

C-5.3 CTC consumption and emission

Total consumption of CTC for Ibuprofen manufacture in the year 1991 (base year taken in India country programme) was 1060 MT. Production of Ibuprofen was growing at 15-20 % per annum. The entire quantity represents consumption as shown in the attached Table, giving break up of CTC use and consumption by one of the largest manufacturers of Ibuprofen in India.

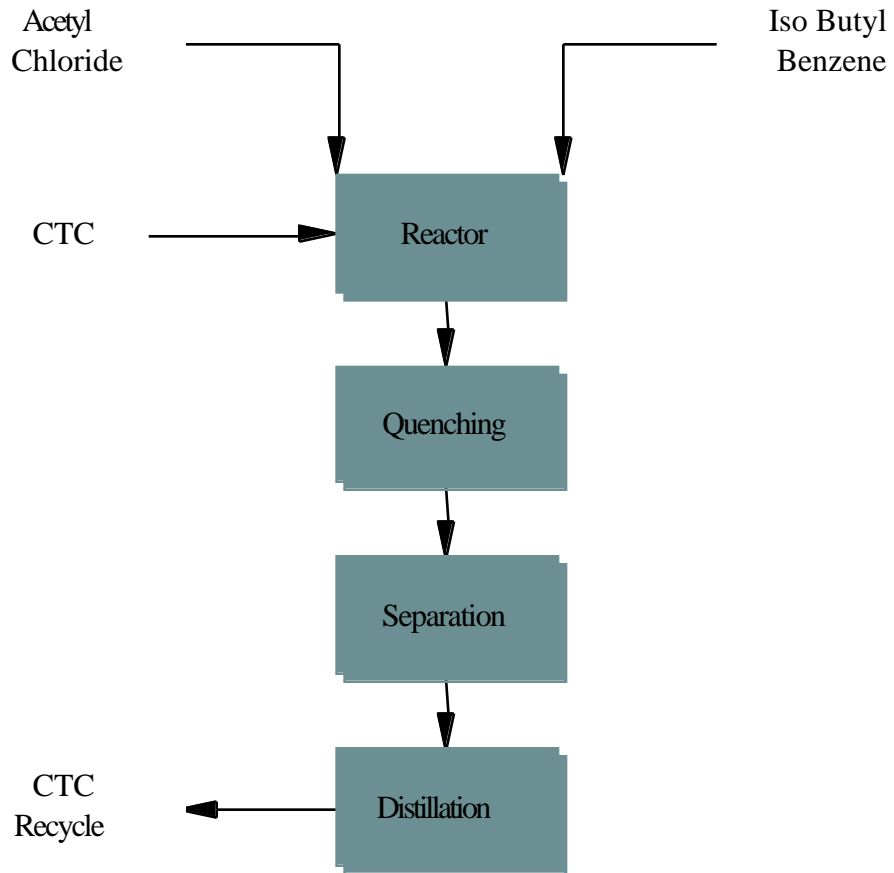
C-5.4 Conversion to use of non-ods solvent

Being conscious of the need for replacing CTC with non-ODS solvent, Ibuprofen manufacturers at their own initiative and considerable expense started covering to the use of Ethylene Dichloride right from the year 1994 onwards. Within about a period of 2 years period 1994-95, CTC consumption for Ibuprofen manufacture has come down sharply and it now stands reduced to a level of around 271 MT. It is expected that assistance will be required to completely eliminate the use of ODS as a process agent in this application.

C-5.5 Flow chart and material balance of Ibuprofen production

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C-5.5.1 Shasun Iso-Butyl Aceto Phenone Process



C-5.5.2 CTC consumption and emission in the Shasun Ibuprofen process

Item Description		Ibuprofen Process
Annual Ibuprofen Production	[t/a]	1332
Annual CTC Recycle	[t/a]	2520
CTC Recycled Per Production	[t/t]	1.892
Annual CTC Consumption	[t/a]	810
CTC consumed Per Production	[t/t]	0.608
Annual CTC Transformed/Destroyed	[t/a]	0.00
CTC Transformed/Destroyed	[%]	0.00
Annual CTC used as CPA	[t/a]	2520
Annual CTC Emission	[t/a]	810
to atmosphere	[t/a]	810
to water	[t/a]	0.00
to product	[t/a]	0.00
Annual CTC Emission	[%]	100
CTC Emission Per Production	[t/t]	0.608
to atmosphere	[t/t]	0.608
to water	[t/t]	0.00
to product	[t/t]	0.00
CTC Emission Per Recycle	[t/t]	0.32

Note: The above enterprise has already converted to a non-ODS process

