

Montreal Protocol



Process Agents Task Force

Case Study #7b

**Use of CTC in Chlorosulphonated Polyolefin (CSM) production in an
Article 5(1) country**

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CS-7b Use of CTC in Chlorosulphonated Polyolefin (CSM) production in an Article 5(1) country

C-7b.1 Introduction

Chlorosulphonated Polyethylene (CSM) is a specialty elastomer with superior properties in resistance to weather, heat, oil, chemicals and abrasion, combined with excellent flexibility and color stability. China began to produce this product in the late 1970's and currently production capacity and output has reached over 3,000 tonnes per year.

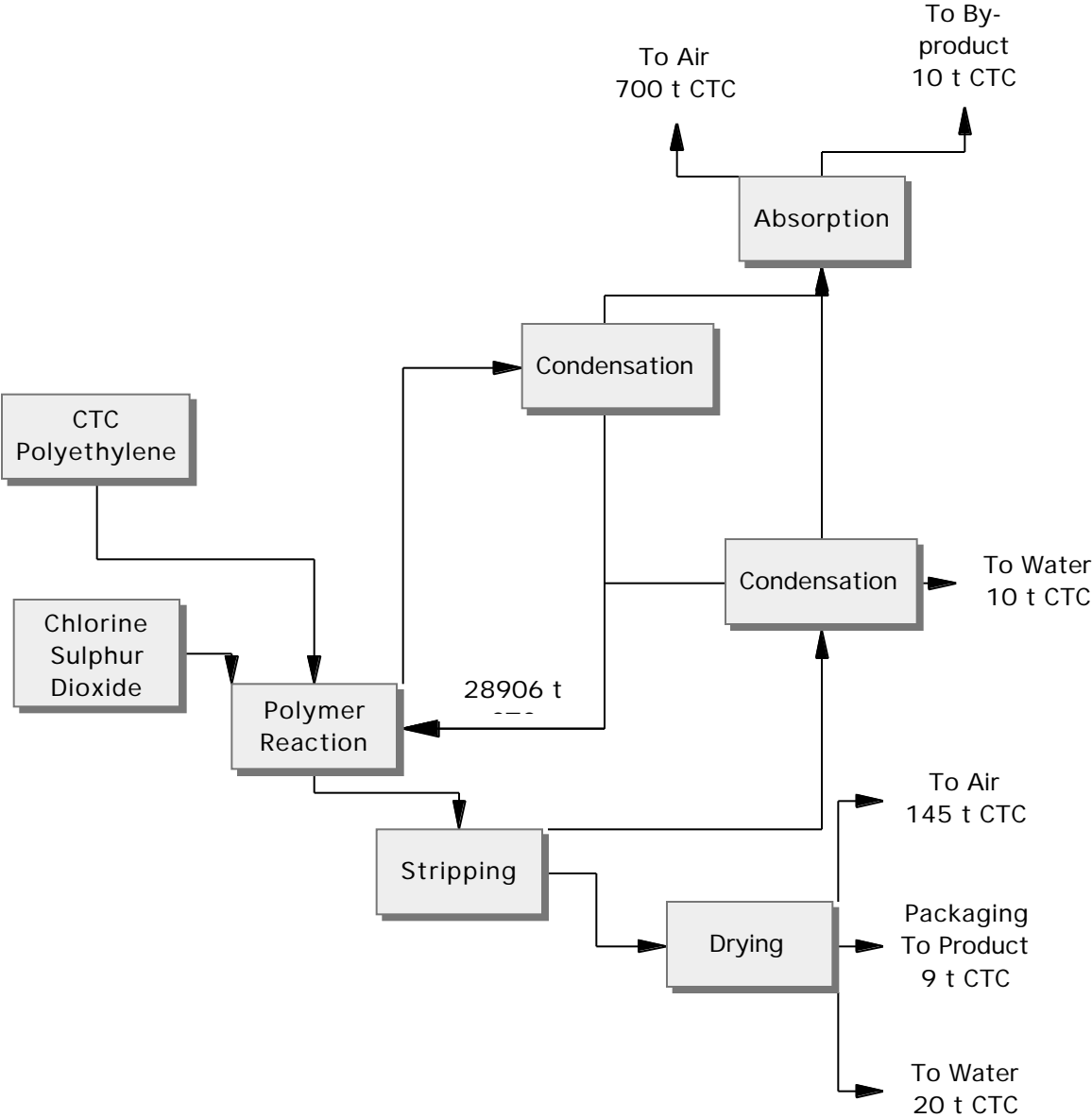
Jilin Chemical Industrial Company Limited (JCICL) is the largest producer of CSM in China. Other CSM producers in China are comparatively small producers and their statistical data are not available as yet. Therefore, only the elaborated JCICL CSM process and its update CTC balance are presented in this case study.

C-7b.2 Description of the process

The JCICL CSM process was a CTC based process, which was developed and improved by JCICL.

Polyethylene is first dissolved in hot CTC and then, together with chlorine and sulphur dioxide, introduced into the reactor, in which the chlorosulphonated product is yielded. The finished product is further isolated by stripping and drying operations and then packaged in the form of chips. The released CTC from the reactor and rear operations is recovered, purified and recycled by condensation and absorption.

CTC balance for JCICL process



C-7b.3 CTC consumption and emissions in the JCICL process

Item Description	JCICL CSM Process
Annual CSM production (t/a)	3,000
Annual CTC recycle (t/a)	28,906
CTC recycled per production (t/t)	9.635
Annual CTC consumption (t/a)	894
CTC consumption per production (t/t)	0.298
Annual CTC transformed/destroyed	0
CTC transformed/destroyed (%)	0
Annual CTC used as PA (t/a)	894
Annual CTC emissions (t/a)	894
to air (t/a)	845 (94.52%)
to water (t/a)	40 (4.47%)
to product (t/a)	9 (1.01%)
Annual CTC emissions (%)	100
CTC emissions per production (t/t)	0.298
to air (t/t)	0.282
to water (t/t)	0.013
to product (t/t)	0.003
CTC emissions per recycle (t/t)	0.03

C-7b.4 CTC alternative process

In the 1970's JCICL had explored the feasibility of using chlorobenzene instead of CTC as a process agent for CSM production. After years of research, this option was abandoned for the following reasons:

1. Energy consumption is much higher than that of using CTC due to higher boiling point of chlorobenzene.
2. Chemical stability to chlorine and sulphur dioxide is not as good as use of CTC in the process
3. In-plant safety is not as good as that of using CTC due to flammability, explosivity and toxicity of chlorobenzene.

