

Overview

Lummus Technology offers the phosgene-free Polimeri/Lummus process for the production of diphenyl carbonate (DPC), a polycarbonate intermediate. In this process, dimethyl carbonate (DMC) reacts with phenol to produce DPC and methanol.

The Polimeri/Lummus DMC process has no environmental or corrosion problems, and the by-product methanol can be recycled back to the DMC process. Since Lummus also offers the Polimeri/Lummus DMC process, there are opportunities for energy integration as well between the DMC and DPC units.

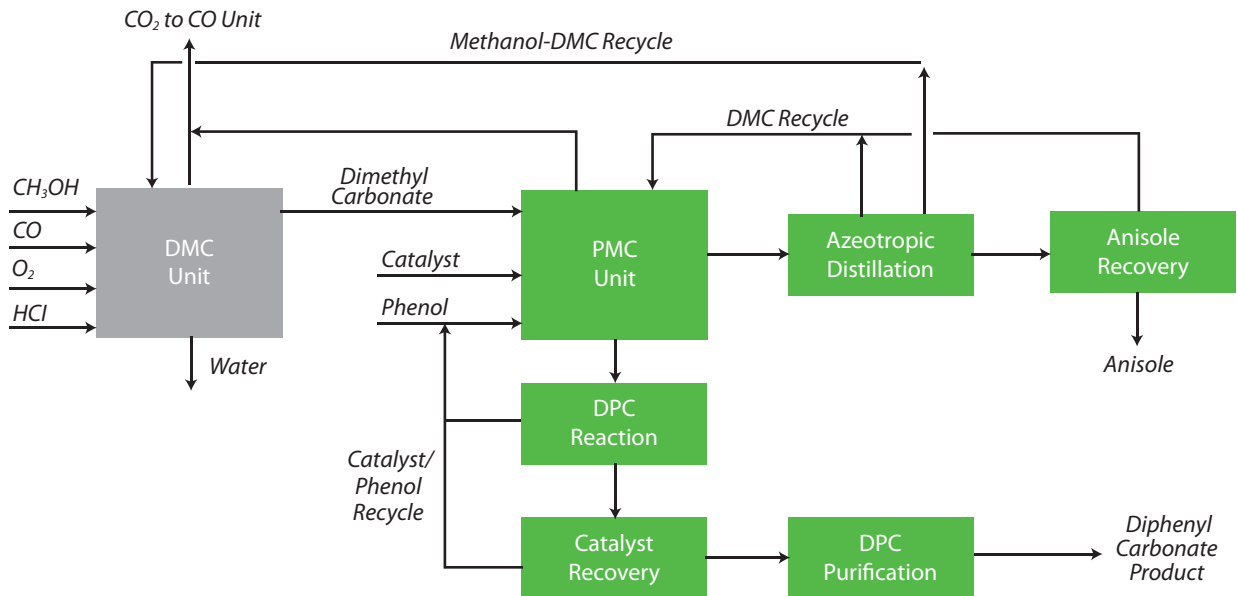
Advantages

Process Features	Process Benefits
High DPC product quality	Improves downstream polycarbonate quality, which is critical for optical media applications
No chlorine involved in DPC synthesis	Environmentally safe • No corrosion problems
Proven at high capacity (over 50 kta per train)	Economies of scale

Performance Characteristics

Typical Overall Material Balance		Typical DPC Product Quality	
Feeds	MT/MT DPC Product	Purity	99.6 wt.% min
Methanol (100% basis)	0.030	Color APHA	20 max.
CO (100% basis)	0.223	Ti	0.1 ppm wt max.
O ₂ (100% basis)	0.127	Fe	0.1 ppm wt max.
HCl (30 wt% solution)	0.010		
Phenol	0.885		
Main Products			
Diphenyl Carbonate	1.000		
CO ₂ to CO unit	0.134		
Anisole (Methoxybenzene)	0.005		

Block Flow Diagram



Process Description

DPC is produced in two steps: phenol and DMC react to form phenylmethyl carbonate (PMC), followed by PMC disproportionation to DPC.

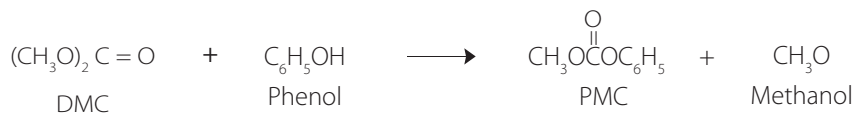
Phenol, DMC and catalyst are fed to the PMC reaction section where a small amount of anisole and CO₂ are also produced. A "light" stream – containing mainly methanol, DMC and anisole – is fed to the azeotropic distillation section, from which a methanol-DMC azeotrope is recycled back to the DMC unit, some DMC is recycled to the PMC

reaction section, and an anisole/DMC mixture is sent to the anisole recovery section.

A "heavy" stream, containing mainly PMC and phenol, is fed to the DPC reaction section where disproportionation to DPC and some heavier by-products occurs. Unreacted phenol is recycled to the PMC section, while the balance is sent to the catalyst recovery area where recovered catalyst is also sent back to the PMC section. DPC is then purified of any residual heavies.

Process Chemistry

Phenyl Methyl Carbonate (PMC) Formation



PMC Disproportionation

