Screening Study To Determine Need For Standards Of Performance For New Sources Of Dimethyl Terephthalate And Terephthalic Acid Manufacturing

Final Report

Contract No. 68-02-1316
Task Order No. 18

Prepared For
ENVIRONMENTAL PROTECTION AGENCY
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July 1976

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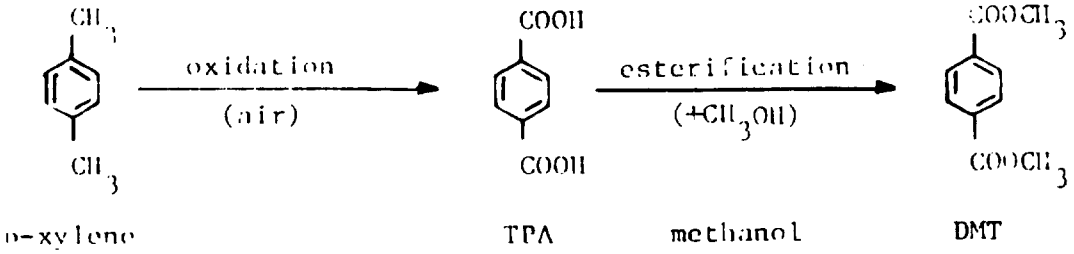
MANUFACTURING

All of the DMT and TPA manufactured in the U.S. is produced from p-xylene feedstock. The p-xylene is air oxidized to form the acid or air oxidized and esterified to form the ester. The reaction is a liquid phase oxidation in which air, the oxidant, is blown through a solution of p-xylene and catalysts to form TPA. The TPA is esterified, usually with methanol, to form the ester, DMT. A simplified chemical reaction sequence is:



p-xylene is a liquid at room temperature. TPA and DMT are white solids at room temperature. The substitution of the -OH group on TPA by $-OCH_3$ groups to form the DMT ester is referred to as esterification.

TPA is insoluble in water and most organic solvents at room temperature whereas DMT is soluble in ether and hot methyl alcohol. TPA does not melt but sublimes at 572°F. DMT melts at 286°F and boils at 550°F. Because of these properties, TPA is usually purified by successive crystallizations whereas DMT is purified by repeated distillations. More thorough descriptions of each DMT-TPA manufacturing process are given in Section II and in References 1 and 3.

In the past, nitric acid was used to oxidize p-xylene. However, with the closing of DuPont's Old Hickory Works in Old Hickory, Tennessee in 1974, no manufacturer uses nitric acid to oxidize p-xylene. Therefore, there are no NO_x emission sources in the manufacture of DMT-TPA.