
This report assesses the chemistry, technologies and economics for the production of pyromellitic dianhydride (PMDA) and trimellitic anhydride (TMA).

Pyromellitic dianhydride (PMDA) has been produced commercially by nitric acid oxidation of durene in the liquid phase (followed by dehydration to the anhydride) and also by the vapor-phase oxidation of durene (followed by thermal dehydration). Hüls has operated the two-step process in Germany and Nippon Shokubai has plans to commercialize a one-step vapor-phase process in the near future. It is believed, however, that the most highly developed durene-based process today is a variant of BP Amoco's liquid-phase oxidation of xylene to produce terephthalic and other aromatic acids (Mid-Century process). In fact, one of the BP Amoco facilities is believed to be capable of oxidizing durene to PMDA in campaign operations with trimellitic anhydride (TMA).

Mitsubishi Gas Chemical-DuPont are believed to practice a three-step process in which pseudocumene is carbonylated to 2,4,5-trimethylbenzaldehyde, which is then oxidized to pyromellitic acid (PMA). The latter is dehydrated to make PMDA. The four routes to PMDA are summarized in the figure on the next page.

Trimellitic anhydride (TMA) is a tri-functional and highly reactive chemical, which makes it an attractive intermediate for a wide variety of chemicals and polymers. The two routes to TMA both proceed via liquid-phase air oxidation. The only difference is the starting material, whether pseudocumene or *meta*-xylene. The pseudocumene based route is shown below.
Process descriptions, economics, and markets for TMA and PMDA are presented in this report.