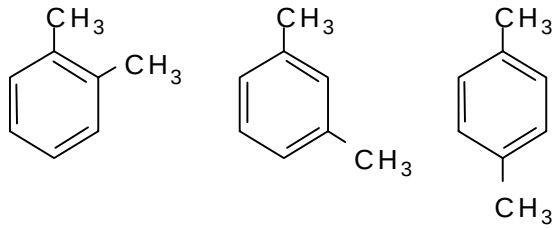
meta-Xylene/Isophthalic Acid (94/95S14)

Although there is a market for mixed xylenes, primarily as solvents, most demand is for the individual isomers, mainly *para*-xylene and *ortho*-xylene. These isomers are utilized as feedstocks for oxidation to terephthalic acid and phthalic anhydride, respectively.



o-Xylene *m*-Xylene *p*-Xylene

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The separation of the various xylene isomers is difficult because of the closeness of their boiling points. Distillation can be applied to a limited extent and requires many separation stages. *para*-Xylene can be separated by crystallization, but this technique has been replaced by selective adsorption in most new plants. A similar selective adsorption technique has been chosen for new *meta*-xylene plants, instead of an earlier complexation process using HF/BF_3.

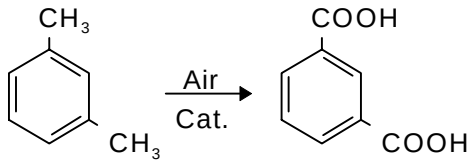
The raffinate from a *para*-xylene recovery operation is typically sent to an isomerization unit to convert its largely *meta*-xylene content into an equilibrium mixture containing *para*-xylene and *ortho*-xylene as well. To recover *meta*-xylene for use in isophthalic acid production, a portion of the feed to isomerization is diverted through an appropriate separation step, such as the MX Sorbex process developed by UOP. This selective adsorption process for *meta*-xylene is an extension of the proven process for *para*-xylene recovery.

The separation of *meta*-xylene via the MX Sorbex process takes place in the liquid phase by passing the feed over an isothermal bed of a solid adsorbent. Continuous countercurrent contacting between fluid and solid is simulated by switching the feed and drawoff points within the adsorbent bed. Two liquid streams emerge from the bed: extract and raffinate. The desorbent used to purge the bed is separated from both the extract and raffinate streams by distillation. This technique produces *meta*-xylene of 99.5 weight percent purity, which exceeds the specification for merchant material.

Prior to the development of the MX Sorbex process, Mitsubishi Gas Chemical (MGC) had commercialized a method to separate *meta*-xylene by complexation using HF/BF_3 to form a 1:1 molecular complex. This technique exploits the high relative basicity of *meta*-xylene.

meta-Xylene of 99 percent purity can be obtained at greater than 99 percent recovery per pass. Thermal decomposition liberates *meta*-xylene from the complex for final purification by distillation.

Isophthalic acid is produced from *meta*-xylene by oxidation with air in an acetic acid solvent, using cobalt/manganese catalysts promoted by bromide. Highly corrosion resistant materials are needed in handling the acetic acid and bromide solution. Purification of the crude acid requires at least one chemical step in addition to physical procedures such as crystallization and washing. This typically takes the form of catalytic hydrogenation in an aqueous solution to convert intermediate 3-carboxybenzaldehyde to *meta*-toluic acid. Aldehyde impurities are a smaller problem with IPA than with terephthalic acid. Aldehyde must be reduced to 25 ppm (weight) and *meta*-toluic acid to 150 ppm to meet purified IPA sales specifications, which also call for a minimum assay of 99.8 weight percent IPA.



m-Xylene Isophthalic Acid

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There are presently only a few producers of isophthalic acid worldwide. Amoco Chemical is the largest producer with capacity in the U.S. and Europe. IPA has been plagued by shortages in recent years due to unexpectedly high growth in demand and plant operational problems. Several new producers have recently announced plans for IPA plants. Eastman chemical plans a 68,000 metric ton per year plant in Kingsport, Tennessee, for startup in third quarter 1998. This plant is stated to fill Eastman's internal need for modified PET bottle resins and to provide intermediates for its customers in coatings, unsaturated polyester resins, and inks. Lonza has very recently announced it plans a 70,000 metric ton per year IPA plant in Singapore by the end of 1998.