

VARIOUS COMMERCIAL PROCESS

Production of *o*-xylene is mainly a separation of the above isomers from *o*-xylene from petroleum crude. The means of separating are varied and have been patented under various names. The conventional process, which is also the process adopted here for the calculations, is explained first.

This process is named ISOMAR and has been patented by the UOP process Division. Slightly differing processes, patented by Maruzen Oil Co., Mitsubishi Gas Chemical Co., Arco technology inc., are also in commercial operation. ISOMAR involves the distillation of *o*-xylene from the other xylenes and then isomerizing the *p*-xylene. The *o*-xylene is then sent to an isomerization reactor where under high pressure of hydrogen and in the presence of a catalyst and at a high temperature, *m*-xylene and ethylbenzene gets converted to *p*-xylene and *o*-xylene. The feed may be of any C₈ aromatic mixture, e.g. from catalytic reformates or from pyrolysis gasoline. The feed along with the recycle is sent into the first pre-fractionator where a C₈-C₉ cut is taken as the bottoms and this feed is passed on another pre-fractionator to retain most of the C₉ compounds as the bottoms.

The boiling point difference between *o*-xylene and the other isomers is next exploited to get a bottom fraction containing mainly C₉ and *o*-xylenes. The C₉ impurities are generally trimethyl benzenes. The C₉ compounds and the *o*-xylene are sent to another fractionator where pure *o*-xylene is taken as the distillate and the C₉ compounds form the residue. The distillate from the first fractionator contains all the xylene isomers and must be processed

for extraction of p-xylene. This is achieved by crystallizing the xylene mixture by any of the commercially available crystallization procedure. The mother liquor from the first stage is sent to a xylene isomerization reactor. The catalyst used are supported platinum metal under hydrogen pressure (Engelhard-Atlantic Octafining 0. The temperature maintained is 425 °C as it is at this temperature that the p-xylene and o-xylene and o-xylene concentration is highest. The catalyst is prepared by mixing equal amounts of silica-alumina cracking catalyst with platinized alumina. The pt content is 0.5 wt %. The reaction conditions are as follows 1.31-1.65 Mpa, hydrogen-hydrocarbon ration < 10:1. With 4-6 :1 preferred, liquid hourly space velocity 0.6-1/h. The liquid temperature initially is 425 °C and is gradually increased to 480 °C. The catalyst can be regenerated at least once by controlled combustion of the carbon, which accumulated over the life of the run.

Toluene dispropotionation to xylenes and benzene is an alternative source of feed . All reactions in this process use Mobil's catalyst and are low temperature and in liquid phase. However, this process in addition to an LTD reactor requires the entire xylene separation procedure.