



Butanediol and Co-Products

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The Davy Process Technology butanediol process can produce in a single reaction train, varying ratios of three products; 1,4 butanediol (BDO), tetrahydrofuran (THF) and gamma butyrolactone (GBL). This flexible process uses maleic anhydride, which can be obtained by the oxidation of butane or benzene, as the feedstock. This allows our licensees to rapidly respond to market conditions to manufacture high quality products for the polymers and solvents industries.

Operating Plants

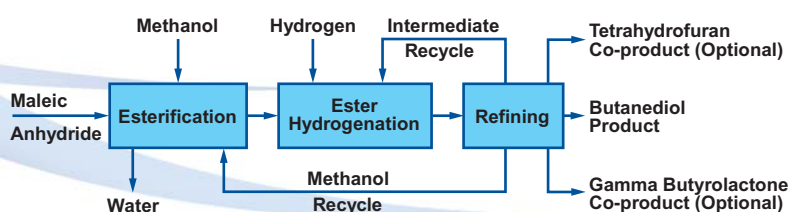
We have licensed eight butanediol plants with nameplate capacity in excess of 450,000 MTPA. This represents 25% of world capacity and 50% of new capacity built since 1992. Our process has now been licensed to eight companies for the production of BDO, of which three plants co-produce substantial amounts of THF and four plants extract the co-product GBL. The plant capacities range from 11,000 to 100,000 MTPA of BDO equivalent capacity.



The Process

Maleic anhydride is esterified using our proprietary reaction column and a solid esterification catalyst to form a di-methyl maleate intermediate ester which is then hydrogenated in the vapour phase to produce a mixture of BDO, THF and GBL. By varying the operating conditions and catalyst exposure the ratio between BDO and THF can be changed to suit market conditions. The GBL is always produced and can be either recycled or extracted as required.

We have developed a product refining system which yields high quality product BDO used primarily in the production of engineering resins such as PBT and UPR, THF used primarily in the production of PTMEG for spandex fibres and GBL used primarily in the production of solvents such as NMP.





Process Advantages

Our process has an established reputation as the low cost, efficient, safe and reliable process that produces a high quality product that is well accepted by the derivative and polymer industries. The esterification step neutralises acidic maleic anhydride enabling hydrogenation and refining systems to be made of carbon steel with base metal hydrogenation catalyst instead of the high grade metallurgy and precious metal catalyst used in competing processes. These cost savings more than compensate for the cost of esterification. Low pressure vapour phase hydrogenation results in extremely low by-product generation giving high process efficiency and high product quality. The process can be easily integrated with maleic anhydride facilities using abundant, low cost butane feedstock.

‘A simple low cost esterification and vapour phase hydrogenation process yielding few by-products with high process efficiency and excellent product quality’.

Process Options

Tetrahydrofuran (THF) is produced as a co-product in the Davy Process Technology process. The yield of THF can be as little as 2% or up to 50% as required and determined by selection of hydrogenation catalyst and process operating conditions. Greater yields of THF can be achieved by use of an additional dehydration reactor. Gamma Butyrolactone can be extracted as a separate co-product if required.

Products

Butanediol is an important intermediate for engineering plastics and fibres. End product applications include polyurethane, PBT and polymers used to manufacture items such as training shoes and car parts.

Tetrahydrofuran is used as an industrial solvent and as a precursor for speciality derivatives such as PTMEG that is used to make Spandex fibres.

Gamma-butyrolactone is an important solvent, plastics additive and chemical intermediate. It is used in a large number of agricultural, pharmaceutical, dye, fibre and plastic compounds.





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Davy Process Technology is a Johnson Matthey company.