

## Modelling fixed bed catalytic reactor for TAME synthesis

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TAME synthesis process is widely used in the petrochemical sector. This study develops a mathematical model in *gPROMS*<sup>®</sup> ModelBuilder simulating the behavior of a fixed bed catalytic reactor with an external cooling jacket for TAME synthesis in a laboratory pilot plant. This includes a pre-reactor, a reactive distillation column and the auxiliary devices. Model implementation is supported by calculations made with *SIMULIS*<sup>®</sup>. For the cooling jacket model, the properties data are imported from *Multiflash*<sup>®</sup> database. An external database to use the *Foreign Object* feature in *gPROMS*<sup>®</sup> is obtained with *Multiflash*<sup>®</sup> for properties calculation. As starting points for modelling data from TAME synthesis experiments in laboratory pilot plant are used. The reactions take place in a fixed bed of acidic catalyst (Amberlyst 35 wet) with a length of 800 mm and a radius of 14.25 mm. The model used is ER type. The model is used to obtain appropriate molar concentration, temperature and reactions rates profiles in time on the two dimensions (axial and radial). These results are obtained by numerical integration with BFDM (backward finite difference method), the one that proved to be stable, on axial dimension and OCFEM (orthogonal collocation on finite elements method) on radial dimension.