Efficient Direct-DME Synthesis; a BASF-Linde Joint Development

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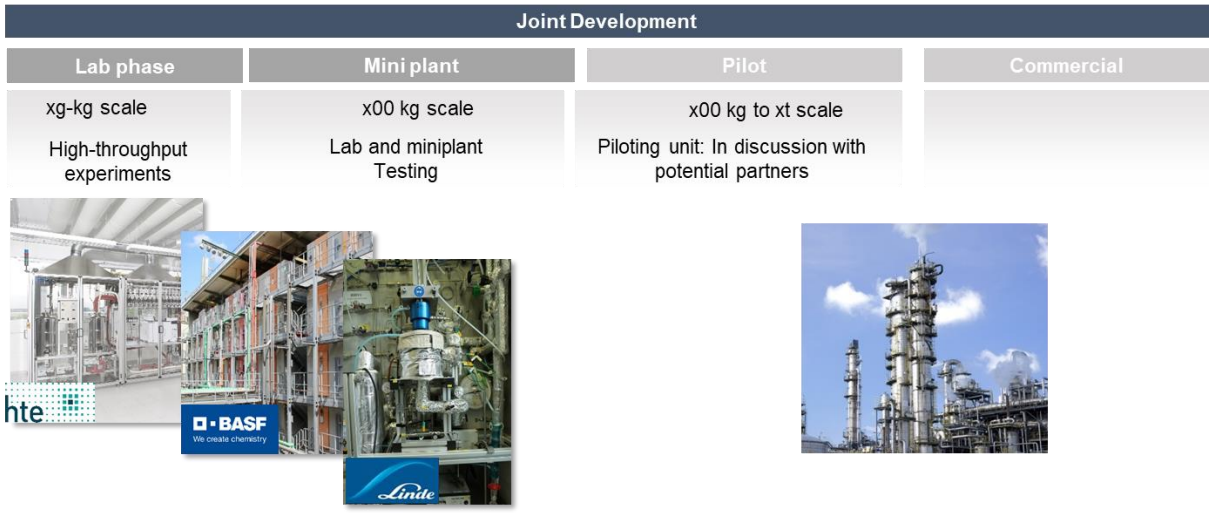
Abstract

Dimethyl ether (DME) has diverse applications in various fields, namely as blending in liquefied petroleum gas (LPG) to improve its burning properties, and also to minimize the impact of deficit of LPG. It has also the potential to be used as biofuel in transportation segment. Conventionally, DME is produced in a two-step process via MeOH, being limited by thermodynamics. BASF-Linde Direct-DME technology is focused on direct conversion of syn gas to DME, taking the advantages of favorable thermodynamics, leading to higher syngas conversion. This process is applicable to medium to large scale DME production and can be operated with a flexible syngas feedstock. A reduced OPEX and lower CAPEX is expected when the proper process condition is applied. Taking the environmental aspect into consideration, this technology can lower CO_2 footprint and it has synergies with dry-reforming technology allowing for further CO_2 import.



For this purpose, there was a need for development of a specific catalyst as well as determining the best process concept. Therefore, a joint development of BASF and Linde on a new technology for the direct synthesis of dimethyl ether from syngas was started more than five years a go where BASF is responsible for the development of catalyst system and Linde dealing with process design.
The BASF-Linde Direct-DME catalyst is a combination of two catalysts, methanol synthesis catalyst and dehydration catalyst in bifunctional catalysis. By optimization of individual catalysts and optimization of catalyst bed structure via individual kinetics of bifunctional catalyst, best configuration for long-term operation and maximum yield identified.
The BASF Direct-DME mini-plant has been running steadily for more than 3500 hours revealing high conversion, high stability, low level of by-product formation.