

# APPLICATION OF PRESSURE AND SCF TECHNOLOGY IN A WORLD SCALE PROCESS

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## ABSTRACT

For the high-pressure process for manufacturing low density polyethylene is one of the largest processes that utilize ethene as supercritical fluid acting as both solvent and reactant. The great freedom operators of these processes earn is the flexibility in choosing process conditions. Due to the large space of pressure and temperature in which ethene dissolves its polymer there is particular freedom in choosing operating conditions. Pressure can be varied in a wide range from approximately 1500 to 3500 bar to affect the reactions rates which influence not only conversion but in particular the micro-structural properties of the formed polymer. The operation level of temperature can be chosen as well as the shape of its profile by selection of appropriate initiators together with proper choice of cooling strategy. By this the polymeric micro-structure can be controlled in quite significant ranges by basic process design. Moreover, there is additional potential to affect the polymeric micro-structure by additives in case their presence is acceptable or metallocen catalysts may be applied at high pressure for producing specific grades of polymers.

The short course will provide an introduction into the process and its physico-chemical background inspecting also the elementary kinetics. It will be demonstrated how from these basics perspectives can be derived for improved understanding of the process or product development. If time permits examples will be discussed for simulation based product design, detailed inspection of polymeric microstructure and process analysis. For any of these it is important that experimental analysis of the product, e.g. by chromatographic techniques, and results from kinetic simulation depict identical information. The importance of this is twofold: First, it plays a role for the correct validation of the model with process data over a variety of products of process variants. Second, the precise description of the polymeric micro-structure is the key information for developments further on, such as building models that describe rheology on the base of micro-structure. These build then the fundament for the description of application properties.