

Polymer Reaction Engineering

3 days
Overview

POLYENG-EN-P

LEVEL

Skilled

PURPOSE

This course provides a technical explanation about the polymerization processes available for the industrial production of commodity polymers and their impact on the final product.

LEARNING OBJECTIVES

Upon completion of the course, the participants will be able to:

- explain the relation between a polymer structure and its associated properties,
- describe how the different types of reactor and use of comonomers impact polymer final properties,
- explain the underlying motivations and constraints encountered in developing polymerization processes for the productions of commodity polymers.

WAYS AND MEANS

Detailed course material with pictures, videos and animation. Non-confidential information about licenses available in the market.

LEARNING ASSESSMENT

Quiz.

PREREQUISITES

To fulfill at least one of the following criteria:

- have a Master degree or equivalent,
- or at least 3 months of proven experience in a technical position related to the development or improvement of processes in the petrochemical industry,
- or in the process of moving towards a position involved in the development or improvement of polymerization processes.

Agenda

POLYMER CHEMISTRY & CHARACTERIZATION

1 d

Main characteristics of polymerization reaction: reaction enthalpy, polymerization initiation, propagation and termination. Use of initiators and catalysts. Types of catalysts.

Chain growth versus step growth polymerization.

Polymer structure - Configuration - Properties relationships.

Polymer characteristics and morphology.

Characterization methods relevant to industrial polymerization: molecular weight distribution, melt index, intrinsic viscosity, nuclear magnetic resonance, gel permeation chromatography, light scattering.

FROM MONOMER TO POLYMER

2 d

Definition of polymer reaction engineering.

Place of the reactor in the whole process. Operation constraints.

Type of industrial polymerization reactors.

Comparison of bulk, solution, suspension, emulsion polymerization processes, with examples of industrial licenses.

Case study: PE gas phase production in fluidized bed reactors.