

Summer Cases

July 2020

Case1:

A mathematical model for peroxide controlled
degradation of Polypropylene

Antecedents

The production of PP fibers requires resins that can withstand high elongational rates and that requires a narrow molecular weight distribution that nowadays can be obtained by using Metallocene Catalyst (MCP) but can also be obtained by adding peroxide to a Reactor Grade PP (RGPP) obtained with the Ziegler-Natta Catalyst. A RGPP has a very wide MWD and is not suitable for fiber production but can be suitable if peroxide is added during the extrusion to form the pellets at the plant.

You are given the MWD of the RGPP and one that has been peroxide degraded and are asked to define a model to predict how much peroxide is needed to have that change.

See the excel files (Case Fiber Spinning MWD PB Resins.xlsx; Case Fiber Spinning Recovery Compliance for all PP resins(1).xlsx).

In the typical lexicon, it is said that the MFI of the RGPP resin needs to be adjusted to higher MFI value (25 to 35) once the peroxide is added.

Questions

- 1) What model can you think of for the prediction of the change in MWD?
- 2) What can you do with the information provided to you in the excel files? Look at the PBR0 and the PBR8 resins

Assignment

Work in groups formed in the break out rooms (time to be spent no more than 2 hours)

- Propose a model to explain the change in MWD
- Report any data possible from the information given to you in the excel file

Case 1: Vis-Breaking of Reactor Grade Polypropylene

Situation:

Reactor grade PP is extruded with Lupersol 101 to modify its MFI, resulting in a fiber grade resin.

Problem:

Need for a model to estimate the amount of peroxide required to target a specific MFI and MWD; and understand the MWD and Creep & Recovery compliance changes.

Questions:

- 1) What are the factors affecting the vis-breaking, other than the peroxide?
- 2) What is the phenomenon?
- 3) What information you can report from tge MWD data and the Creep and recovery compliance data?