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Catalyst for betterment of humans

Muteeb Ahmed Siddiqui
Hamdard University, Pakistan

Future plan to make PET heavy metal free for human friendly packaging material, toxic heavy metal has to be replaced with light metal catalyst is the ultimate objective. Adverse effects of heavy metals including, life threatening diseases by damaging of brain, kidney, lungs in fact damage to all major organs. At present heavy metal migration limits are 40 ppb. For one of its kind project, series of trial were designed, out of which first two light metal catalyst trials on one of the world largest PET production lines did not results in the desired heavy metal free process with high process stability and high production quality as demonstrated on pilot lines. Therefore, a second pilot plant trial was executed to define root causes. In the latest pilot plant trial results from previous pilot plant trials could be repeated and exceeded by switching the new catalyst injection point from post-ester (second chamber of reactor) into esterification (first chamber of reactor), respective in the paste tank (giving it better mixing and more residence time). It has to be mentioned that in early commercial line trials it was thought that the new catalyst (light metal) could be partly deactivated in the esterification reactor due to too high end groups (COOH) and water content and that it would be most safe to feed the catalyst into the post ester reactor. Furthermore the esterification reaction is auto-catalyzed by H^+ from the COOH and can run without any catalyst. After the commercial trials, the suspicion arose that the catalyst suffers a poor mixing when fed in the post-ester and that it should be tested to feed the catalyst into the paste or esterification chamber to ensure complete mixing. During pilot plant trial, it was a great surprise when feeding the new catalyst (light metal) in the esterification reactor that even with only 7.5 ppm it was possible to reach a stable viscosity after the melt phase polymerization of 0.80 dl/g at 100% name plate capacity. The slight deterioration in optical quality was later easy to adjust to standard color with addition of a small amount of toner. Another finding in that trial was that the esterification conversion should be above 90% otherwise a loss of viscosity after melt phase polymerization is possible. Along with minimizing human health concerns, stable process, energy efficient and better optical quality in PET are of prime interest in the establishment of light metal catalyst.

Biography

Muteeb Ahmed Siddiqui has completed his Engineering from Hamdard University, Pakistan. He is the Process Engineer of Octal, world largest PET manufacturer clear resin packing facility in Oman. He has vast experience of working in different polymer plants of resin and downstream products.

mas.gtti@gmail.com

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