Eastman TMPD glycol

Synthesis tips for processing directly with anhydrides

Eastman publication N-307, Building blocks for better resins, contains many useful synthesis tips for the production of polyester resins. Among the various synthesis tips is one for TMPD glycol that reads, "Avoid direct reaction with anhydrides." If anhydrides are reacted directly with TMPD glycol, much decomposition could occur, resulting in discoloration of the resin and excessive organic distillate.

If TMPD glycol-containing resin formulations require an anhydride, the first and best method of reducing decomposition is to prereact either the anhydride or TMPD glycol with other reactants. However, this may not be possible when large amounts of anhydride are being used or when TMPD glycol is the only glycol in the formulation. When your formulation is best served by reacting TMPD glycol directly with anhydrides, there are two methods that may help minimize decomposition and ease processing: premelting TMPD glycol and solvent processing.

Premelting technique

By simply melting TMPD glycol in the reaction vessel (46°–55°C [114.8°–131°F]) and adding the anhydride to the molten material under agitation, decomposition normally encountered in TMPD glycol/anhydride fusion reaction can be minimized for some formulations. For one series of resins, discoloration and organic distillate were brought to acceptable levels when trimellitic anhydride was added to molten TMPD glycol. When the two materials were charged and heated together, resin synthesis was not possible.

Solvent processing

Another approach to processing TMPD glycol directly with anhydrides is to add small amounts of solvent to the cook. The solvent allows TMPD glycol to liquefy at a lower temperature and more evenly distributes reactor kettle heat. Also, this technique facilitates processing of some TMPD glycol/anhydride resins, resulting in lower acid numbers with reduced heat history. Typically, 3%–7% xylene is added to the reactor charge and allowed to reflux during resin synthesis.

Conclusion

When possible, it is still better to stage TMPD glycol and anhydrides separately in polyester cooks. However, when it is necessary to directly react TMPD glycol with an anhydride, premelting TMPD glycol or using solvent processing provides the opportunity to synthesize resins that may otherwise be impossible to make.

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