RHEOLOGY SOLUTIONS

PROCESSING CHARACTERISTICS OF POLYCARBONATE/ACRYLIC ALLOYS

PROBLEM
Subtle differences in batch-to-batch polymer alloy composition can significantly affect processability and final product quality. Hence, a test is desirable which can predict how a process should be altered to ensure consistent product.

SOLUTION
Controlled stress rheology, which assesses the flow properties of molten polymers at processing temperatures, provides a convenient technique for detecting batch-to-batch differences. Specifically, oscillatory tests, which subject the polymer to a cyclic stress, enable dynamic properties related to processability such as complex viscosity ($\eta^*$) to be measured. Figure 1, for example, compares the complex viscosities of two batches of polycarbonate/acyllic alloy at several different potential processing temperatures as a function of frequency. As expected, at all the temperatures chosen, the viscosities for both batches decrease as the frequency (roughly speed of extrusion) is increased. Note that at 200°C, however, the two batches exhibit identical behavior. Hence, 200°C should be the best extrusion temperature for obtaining consistent product. Figure 2 compares the viscosities of the two batches at constant temperature (200°C) and constant oscillation frequency over time. The more rapid increase in viscosity for Batch B with time indicates lower stability (faster onset of decomposition). Therefore, a processing window less than 1000 seconds is desirable for consistent product.

For more information or to place an order, contact:
TA Instruments, Inc., 109 Lukens Drive, New Castle, DE 19720, Telephone: (302) 427-4000, Fax: (302) 427-4001
TA Instruments GmbH, Alzenau, Germany, Telephone: 49-6023-30044, Fax: 49-6023-30823
TA Instruments Japan K.K., Tokyo, Japan, Telephone: 813-5434-2771, Fax: 813-5434-2770
Internet: http://www.tainst.com

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