

OnCap™ Chemical Foaming Agents

Challenge

Polymer processors face the challenge of producing a variety of parts in different shapes and sizes, with different polymer resins, on different types of processing equipment. The commonality is that all of these parts should be made at rapid line speeds to maximize efficiency, with high quality and low cost. To stay competitive, processors must ensure that parts meet dimensional, functional and aesthetic specifications with minimum plastic content while being easy to process (fast cycle times and low scrap rates).

Solution

Chemical Foaming Agents (CFA) provide a multitude of benefits to improve polymer processing in a variety of situations. CFAs are formulated products that will decompose in a polymer during processing at a specific temperature, and liberate a gas that will form a controlled cellular structure in the solid phase of the polymer. This cellular structure can help parts achieve and retain their dimensional, functional and aesthetic specifications.

There are two classifications of CFAs, described by the thermodynamic nature of their decomposition reactions: exothermic and endothermic. Exothermic CFAs release heat energy as they decompose. The most common exothermic CFA is based on azodicarbonamide (ADC), which yields predominantly N₂ gas and trace amounts of NH₃. Endothermic CFAs absorb energy as they decompose, with combinations of citric acid derivatives and bicarbonates the most common components used. Endothermic CFAs yield predominantly CO₂ gas with trace amounts of H₂O.

Selection of the proper CFA is quite dependent on the specific application conditions and requirements, especially base polymer material and process conditions and control. The key to success is to ensure that the CFA is completely decomposed and kept in solution in the polymer melt until the melt blend exits the die or nozzle. Then, the gas should be allowed to expand while remaining trapped in the fast-cooling polymer solid phase.

Value

The use of CFAs offers many advantages for processors and OEMs. Overall cost of product is reduced as less polymer is used per part; scrap rates are lowered; cycle times are improved; and energy and shipping costs are reduced. The marketability of the finished part is enhanced as special



visual or tactile effects are achieved, heat and sound insulation is increased, warpage is controlled, sink marks are eliminated, and lighter-weight parts are delivered to the marketplace.

Implementation

OnCap™ formulated CFA products are available in concentrated powder or pellet form in carrier systems that are compatible with most application resins. CFA concentrates are usually used in very small amounts, in most cases ranging from 0.1% to 1.0% addition rate. Some applications may require higher addition rates up to 6% to 8%, but these are very limited. CFA concentrates are easy to handle and feed using the conventional feeding equipment used in polymer processing.

Application

CFAs are used in most polymer processes, including extrusion, injection molding, structural foam molding, rotomolding, blow molding and blown film. CFAs find use across a wide range of market applications, including packaging, transportation, medical devices, building and construction, wire and cable, toys and other consumer goods, industrial goods, and wood/plastic composites.

PolyOne offers a one-stop source of color concentrates, additive concentrates, color and additive systems, and associated technology and support services. Our expertise extends across a wide variety of industrial and consumer markets. We have more than 20 manufacturing locations in North America, Europe and Asia, with color labs, design centers and sales offices located around the world.

Please contact your nearest sales office for assistance in choosing the right solution for your needs.

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