Polymer processing andmanufacturingimprovementname theses example

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IntroductionPolymethyl methacrylate (PMMA) is a chemical and synthetic transparent thermoplastic material serves as an alternative for glass formed from the methyl methacrylate polymerization. The transparent plastic material from the acrylic resin family manufacturing and processing improvement employ scientific polymerization principles and mechanisms for the productivity and quality improvements. Thus, the processing and manufacturing process does not only focus on the industry or market needs but also health, environment and the social effects. The analysis presented in this paper is helpful in understanding the definition of the PMMA and its properties. Further analysis in this paper, explores the biocompatibility and the polymers biodegradability (Sinha, Briscoe &World Sciences (Firm). (2009). In addition, the paper and analyses the processing steps by explaining the processing mechanisms, steps and the product production standards. Lastly, the polymers quality and production test standard such as density, compression, bending and the tensile tests are also provided. Definition and the properties for PMMAPMMA is a rigid, tough and transparent of the resin family found in paint and glasses. On the synthesis of the material, the polymer produced by bulk, solution and emulsion polymerization processes by the initiation of the radiations that aids in its extraction from its primary source. The polymer material is cut and joining properties by the application of solvents or welding that dissolves the plastic joints (Polymer Process Engineering (Conference), Coates, University of Bradford., & Institute of Materials, 2001). The PMMA material dissolves in organic solvents, transmit visible light, allowing both refractions of light and

blockage of the infrared light. On a differentpoint of view, the polymer burns in air to formcarbon (IV) andwater. The polymer has a good environmental stability and a poor resistance to manychemicalsas it readily hydrolyzes forming esters. On a broad front, furtheranalysis on the properties modification reveals, addition of acrylates comonomers in small proportions to improve grades and additional of butyl acrylates to improve the product's strength. In addition, methacrylic acids are added to increase transition temperature where the glass material qualityis improved. An impact property is improved during processing by the addition of the plasticizers as the glass transition temperature is lowered. The cost effectiveness of the polymer is added by incorporating filters during the production process as well as adding dyes to produce a decorative color application. Biocompatible and biodegradableBiocompatibility of polymers involves blending of polymers to modify the properties of the original product or forming a new product of polymers while the biodegradability takes account for the sustainability and renewability of the polymer materials that safeguard the future generation health as well as environmental health. Biocompatibility results in high quality products of polymers as the boosted in strength and complexity and the process is useful in selecting plasticizers (Morton & Ellis, 1986). The polymer compatibility is the most referred standard measures for testing and comparing the quality of the polymer materials. Thus, the quality, durability, strength and other test are evaluated by the polymer standard measures.

Processing of the PMMA and how the steps work with ISO and ASTM standard for polymersPolymerization process steps

Step 1 injection molding

The powered and pellets are heated to liquids and the materials are pressurized to solidify as the wastes are removed. The molded components include pails and toothbrush elements.

Step 2 compression molding

The preformed powders and heated under low temperature and pressure and compressed to form molds.

Step 3 transfer molding

This process involves modification of material to produce thermosetting plastics. Thus, polymers are heated in chambers as the materials are forced to follow through runners and gates with raised temperature and pressure forcing the plastics to harden and unwanted parts removed.

Step 4 Blowing molding

This step involves softening of the plastic tubes, solid shells removal as well as production of bottles.

Step 5 extrusion

This process involves fixation of color and additives heating and forceful cooling, allowing materials to dye up. The molten polymers reach the final stage at this process.

Polymer tests

Tensile, compression, densityandthebendingtest are thestandardtests that determinethequality of the polymer materials. Tensile test measures breakability properties such as modulus, strength, elongation and strain quality of the polymers. Compression test determines friction properties as density and bending test determine surface hardness of polymers as well as compressive strength(Coates, Institute of Materials (London, England), & Polymer Process Engineering, 1997)

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