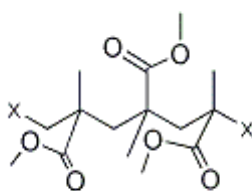


Technical Data Sheet

PMMA

Poly(methyl methacrylate)

Description



Chemical Name	Poly(methyl methacrylate)	Formula	C ₁₅ H ₂₄ O ₆ X ₂
CAS #	9011-14-7	Mol. wt.	300.35

Specifications

Item	Specification
Melting point	150 °C
Density	1.188 g/mL at 25 °C
Refractive index	n ₂₀ /D 1.49
Flash point	250 °C
Storage temp.	2-8°C
Solubility	alcohols and aliphatic hydrocarbons: insoluble
Form	powder
Color	White
Water Solubility	Insoluble water
Stability	Stable

Applications

Biomedical

PMMA has been used in the area of biomedical applications, which involves the preparation of bone cements for drug delivery/release and cranioplasty. The qualities that made the polymer a potential material for these applications include: non-toxicity, less cost, easy processability, compatibility, minimal inflammatory reactions with tissues, and greater fracture resistance, especially when used in cranioplasty.

PMMA has also been used to widen the applications of chitosan in various fields that include biomedical and pharmaceutical applications. Zuhair et al. reported the successful grafting of a PMMA/chitosan blend. The results indicated an increase in the mechanical properties, such as tensile strength and flexural modulus. The degradation, porosity, and water absorbency of the blend in synthetic body fluid (SBF) with a pH of 7.4

increased with an increase in the chitosan percentage and immersion time in SBF. These behaviors exhibited by the PMMA/chitosan blend illustrate its potentials for drug release applications

Molecular Separation

Molecular separations in chemistry can be achieved in an advanced way by the use of chromatographic techniques, which involve the use of a stationary phase (inert solid support) and mobile phase (usually solvent or mixture of solvents). The common solid supports used are inorganic materials such as silica and alumina, but they have low patronage due to their disadvantages in separating some organic molecules, and limited modifications for maximum efficiency. Therefore, both natural and synthetic polymers have recently been used to replace the inorganic materials. PMMA is the most promising synthetic polymer for applications in molecular separation due to its low cost, compatibility, ease of modification, and processability.

Optical applications

Optical science is relevant and studied in many disciplines, including engineering, medicine, pure science, and astronomy. Practical applications are found in lenses, microscopes, lasers, fibers, and polymers, to name a few. The optical activity of any material is the result exhibited by that material when interacting with light and the refractive index is the measure of that activity. The optical applications of PMMA are due to its refractive index, good resistance to UV light, chemical durability, and good mechanical properties.

Organic polymers are usually cheap, lightweight, and easily processed substrates, and are therefore good for immobilizing semiconductors for heterogeneous photocatalytic applications. Camara et al. revealed the investigation of eleven synthetic polymers susceptible to coating with TiO₂ for exposure to solar radiation, with and without the TiO₂ layer, for 150 days to study the weathering. They observed that only the PMMA retains good optical and mechanical properties of the Titania after natural weathering. Therefore, PMMA is the best candidate for the immobilization of TiO₂ for photocatalytic treatment applications.

Polymer conductivity and electrolytes

Most polymers are electrical insulators. However, conducting polymers can be prepared using an insulating polymer and electrically conductive fillers called dopants. The electrical properties of PMMA doped with conducting materials under various experimental conditions including photo-induced changes, has been studied. PMMA was used as an organic insulator, while the PVA-PAA-glycerol was a semiconducting polymer. Aluminum electrodes were used as bottom and top electrodes for the fabricated devices. Finally, organic memory devices were prepared based on the Au-Pt- Ag nanoparticles as charge storage elements. Herein, PMMA was used as the organic insulator.

A polymer electrolyte membrane for battery application must play the following roles: must enable positive ion transport such as Li⁺ between the electrodes, must block the electron transport, and must be rigid to prevent direct contact between the electrodes. The application of PMMA in the polymer electrolyte was due to the amorphous nature for porosity's sake and the mechanical strength it has for the provision of the rigidity to the polymer electrolyte membrane.

Sensor application

In search of the production of a quasi-solid-state dye-sensitized solar cell (DSSC) using a high conductivity polymer gel electrolyte, a suitable polymeric material was needed to be a host matrix in the composite. Therefore, PMMA was found to be a good and compatible polymer for this purpose. This was attributed to its

mechanical strength, compatibility, and optical clarity.

Solar and nanotechnology applications

Due to the wider application of nanocomposites in the field of nanotechnology, many researchers focused their attention on nanocomposites, their fabrication, and applications. Perween et al. reported the use of PMMA and graphite to fabricate plastic chip electrodes (PCEs) via a simple solution casting method. This characterization was made using microscopy (SEM and AFM) as well as thermal properties (TGA), and mechanical and electrical properties. The fabricated electrode was economically inexpensive, multipurpose, and dispensable for various applications.

Delivery & Storage

Package	As required		
Storage	Keep package closed. Store dark and dry	Shelf Life	2 years