Methacrylated carboxymethyl cellulose (CMCMA)

Cat. No.: M1518247 | Pack size: 1 g, 5 g | Storage: Protected from light; store at -20℃

Overview

Carboxymethyl cellulose (CMC) is the most widely used and most abundant cellulosic material. CMC is non-toxic, odorless, stable in performance, and readily soluble in water. It is commonly used in the production of wound dressings to prevent wound infection, control exudate, and promote wound healing. Since the human body lacks cellulose-digesting enzymes (cellulases), cellulosic materials can resist degradation and maintain structural stability for a long time when used as implant materials. This property enables cellulosic materials to be applied in preventing postoperative peritoneal adhesions, reducing the incidence of intestinal obstruction, and other applications.

CMCMA is a photosensitive polymer material obtained by modifying carboxymethyl cellulose (CMC) with methacrylic anhydride (MA). It can be used in combination with blue light or UV photoinitiators to undergo cross-linking and curing under blue light or UV irradiation. This polymer exhibits excellent biocompatibility, structural stability as an implant material, and simple curing properties, making it suitable for applications such as controlled drug release, tissue engineering organ construction, wound dressings, and anti-adhesion barrier layers.

Product Specifications

Component	Appearance	Specification	Remarks
CMCMA	White or off-white powder or granules	1 g/vial, 5 g/vial	Store in the dark.

Usage Recommendations

1. CMCMA can be used in combination with o-nitrobenzyl alcohol-modified polymers, such as PEGNB, HANB, and GelNB. Both can be polymerized and cross-linked upon illumination with photoinitiators LAP or NAP, yielding high-strength hydrogel materials in just a few seconds.

2. CMCMA can be used in combination with methacryl-modified polymers (e.g., HAMA, GelMA, CSMA, ChMA) and acryl- modified polymers (e.g., F127DA). Polymerization is initiated by photoinitiator illumination to construct hydrogel materials with diverse physicochemical properties.

3. CMCMA can be used alone, undergoing polymerization and cross-linking upon illumination with a photoinitiator.

Preparation Method

1. Preparation of photoinitiator stock solution: Dissolve a specific mass of NAP or LAP to prepare a solution with a concentration in the range of 0.1 wt%-0.25 wt%, and store at 2-8 ℃ away from light.

2. Transfer the required mass of CMCMA into a centrifuge tube, then add the required volume of the photoinitiator stock solution to the tube.

3. Stir the sample at room temperature in the dark or shake it on a shaker until completely dissolved. If the sample clumps in the solution, first crush it with a spatula; if dissolution is slow, heat and stir at 50-60 ℃ to aid dissolution.

Precautions

1. The higher the labeling rate (degree of substitution) of CMCMA and the higher the prepared concentration, the greater the modulus of the cured gel and the shorter the curing time.

2. The higher the molecular weight of CMCMA, the better the toughness of the cured gel and the less prone it is to fracture.

3. The higher the molecular weight of CMCMA, the greater the viscosity of the prepared solution. For CMCMA with a molecular weight of 300 kDa, the recommended concentration does not exceed 3 wt%; for CMCMA with a molecular weight of 90 kDa, the recommended concentration does not exceed 6 wt%.

4. The higher the concentration of the photoinitiator stock solution, the faster the curing rate of the CMCMA solution and the more brittle the resulting cured gel.

Product Applications

1. Controlled drug release, bioprinting, tissue engineering organ construction, wound dressings, anti-adhesion barrier layers, etc.

2. Chondrocyte differentiation: Constructing cell-laden hydrogels to promote the re-differentiation of chondrocytes in vitro.

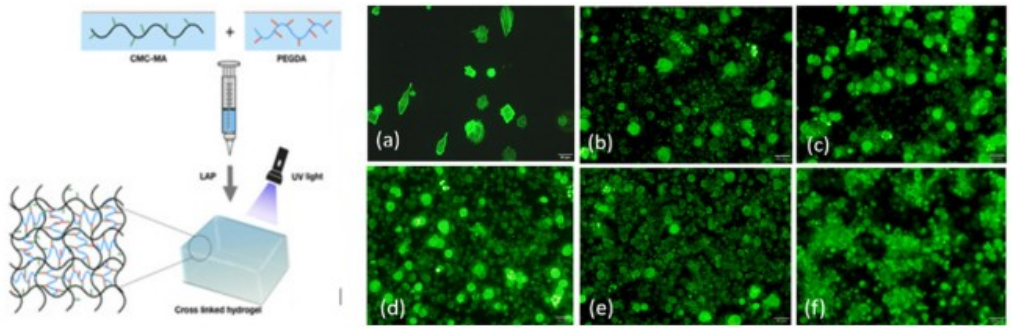

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Fig. 1 Chondrocyte differentiation using CMCMA-based hydrogels.

Sterilization Methods

1. Filtration sterilization (recommended): Sterilize the solution by filtration using a 0.22 μm sterile syringe filter. This method is only suitable for low-concentration solutions; for high-concentration solutions, use pasteurization or autoclaving.

2. Pasteurization: Heat the solution to 80 ℃ and hold for 30 min; then rapidly transfer it to an ice-water mixture to cool to room temperature. Repeat this process three times.

3. Autoclaving: Sterilize the solution in an autoclave at 121 ℃ for 8 min. After manual venting, rapidly transfer the solution to an ice-water mixture to cool to room temperature. Note that high temperatures can reduce gel performance, so strict adherence to the above steps is required when using this method.

Note: Sterile solutions can be stored temporarily at 2-8 ℃ away from light and are recommended for use within 7 days; non- sterile solutions can be stored temporarily at 2-8 ℃ away from light and are recommended for use within 48 hours.

Product Advantages

1. Batch Consistency: Standardized production processes are adopted to ensure high repeatability and controllability of CMCMA in composition, physicochemical properties and biological characteristics across different batches.

2. Ultra-High Purity: A unique production process is used to effectively remove small molecules of methacrylic acid and process impurities, achieving an ultra-low impurity level and ensuring the safety of CMCMA for biomedical applications.

3. Reliable Safety: Each batch of product is released only after strict standardized testing, guaranteeing the safety of CMCMA in biomedical applications.

4. High Stability: In accordance with the Guiding Principles for Stability Study of Non-Invasive Implantable Medical Devices, real-time stability and accelerated stability tests have verified that CMCMA maintains stable quality under the labeled storage conditions.

Specifications

Property	Value
Synonyms	Methacrylated carboxymethyl cellulose | CMCMA
Specifications & Purity	BioReagent,Molecular weight 90 kDa; Degree of substitution 40%-50%; Methacrylic acid residue ≤100 ppm
Stability And Storage	Store at -20 ℃ long term (24 months). Store in the dark.
Storage Conditions	Protected from light,Store at -20℃
Shipped In	Ice chest + Ice pads This product requires cold chain shipping. Ground and other economy services are not available.

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