

Saptasense Protocol

Dextran Hydrogels via N,N₀ - methylenebisacrylamide crosslinking

Background:

This protocol describes the synthesis of dextran hydrogels by the crosslinking reaction of dextran with N, N₀-methylenebisacrylamide (MBAm), as previously described by Imren, et al. 2006. The N-containing functional monomer crosslinks with dextran to produce a stable polymer. In the presence of NaOH, the dextran/MBAm system undergoes simultaneous opening of acrylic double bonds causing the crosslinking to form a dextran/MBAm hydrogel (Imren, et al). Characterization studies can be completed using Fourier transform infrared spectroscopy to study the chemical structure of the hydrogel. Other studies include measuring mass of dry and soaked hydrogel to calculate the swelling ratio and water holding capacity, and stress-strain tensile strength models.

PROTOCOL: Dextran Hydrogels

Materials

ddH₂O
2.8M NaOH
MBAm
Dextran
Petri dishes (60 mm diameter)
100 mL Erlenmeyer flask

Instruments

Magnetic stir block
Magnetic stir bar
Incubator

Methods

- Create a 250 mL stock solution of 2.8M NaOH
- Add 12.5 mL of 2.8M NaOH to a tared 100 mL Erlenmeyer flask. Begin stirring magnetically with a small stir bar.
- Weigh 2.5 g of dextran. Slowly add to the flask and continue to stir until fully dissolved. This creates a 20% (w/v) dextran solution.
- Weigh the full flask and calculate the mass of solution.
- Based on the solution mass, add the appropriate amount of MBAm crosslinker to create the desired %(w/w) hydrogel
 - Example: Dextran solution weighs 18 g. 1.8 g of MBAm is added to make a 10% (w/w) MBAm hydrogel.
- Thoroughly mix the crosslinker by magnetically stirring for 10 minutes. Once mixed, pour the final hydrogel solution into a tared 60 mm petri dish. Cover and parafilm the dish.
- Place the petri dish into a 25°C incubator overnight. This will solidify the gel.

- Remove parafilm and lid from petri dish. Measure the height of the gel. Weigh the dish to calculate the gel's dry mass.
- The gel can now be used in various characterization assays (see "Dextran Hydrogel Characterization")

Protocol adapted from Imren, et al., doi:10.1002/app.24670