

Guar gum based biodegradable hydrogel for water purification and sanitary applications

The innovation addresses the problem of finding a low-cost, biodegradable material for water purification and sanitary applications. Existing hydrogels often take a long time to degrade after use. This new guar gum-borax (GGB) hydrogel is completely biodegradable within 3-4 days when in contact with moisture. The expected use of the innovation is in sanitary products, especially sanitary napkins. The GGB hydrogel was specifically tested for aniline blue dye removal and found to be highly effective, decolorizing almost 94% of the dye within 60 minutes. This suggests its potential for use in absorbing menstrual fluids.



The guar gum based biodegradable hydrogel in dry and swollen conditions

Salient Features:

The GGB hydrogel has several unique features that make it a promising solution:

- **High Absorbency:** The optimized hydrogel can absorb up to 100 grams of water per gram of its dry weight, ideal for sanitary napkins, where efficient fluid absorption is crucial.
- **Rapid Biodegradability:** Unlike existing hydrogels that take a long time to degrade, the GGB hydrogel decomposes completely within 3-4 days in the presence of moisture in hot water.
- **Effective Dye Removal:** The GGB hydrogel removes almost 94% of aniline blue dye within an hour, showing high effectiveness in absorbing menstrual fluids and other contaminants.
- **Water Purification:** The hydrogel acts as an excellent adsorbent, effectively removing harmful dyes and other pollutants from water. It showed remarkable efficiency in decolorizing aniline blue dye, this shows its effectiveness in absorbing menstrual fluids and other contaminants.

Benefits:

- **Cost-Effective Synthesis:** The production process is simple, single-step, and can be easily scaled up for mass production.
- **Environmentally Friendly:** Unlike existing hydrogels that take a long time to degrade, this product offers a sustainable solution.
- **Rapid Biodegradability:** Completely decomposes within 3–4 days in moisture. Can be dissolved in hot water for quick disposal.
- **High Water Absorbency:** Can absorb up to 100 grams of water per gram of its dry weight. Ideal for **sanitary napkins** and other absorbent applications.
- **Eco-Friendly & Skin Safe:** Made from natural, biodegradable ingredients (guar gum and borax). Offers a sustainable alternative to petroleum-based hydrogels.
- **Wide Application Potential:** Applicable in sanitary products, water purification, and other absorbent-based uses.



Developed by
ICAR- National Institute of Secondary Agriculture, Ranchi, Jharkhand
Contact: Director, ICAR-NISA, Ranchi, Ph: 0651-2261156
E-mail: director.nisa@icar.gov.in

