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## Borax cross-linked guar gum hydrogels as potential adsorbents for water purification

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### Highlights

- Synthesis of borax cross-linked guar gum hydrogels and its optimization
- Characterization with FTIR, surface morphology, thermal and water absorption studies
- Evaluation of flocculation efficiency at different pH, cross checked with floc size
- Comparison with commercial coagulant alum and evaluation of Al & K residues by ICP-OES
- Evaluation of (aniline blue) dye removal efficiency

### Abstract

With the aim to explore new adsorbents for water purification, guar gum based hydrogels were synthesized by cross-linking with borax at different percentage. The cross-linking was confirmed through characterization by FTIR spectroscopy, SEM morphology, thermal studies and water absorption capacity. To examine the adsorption / absorption performance of different grades of hydrogels, their flocculation efficiency was studied in kaolin suspension at different pH by standard jar test procedure. The flocculation efficiency of the test materials was compared with the commercially used coagulant, alum and also residues of Al and K left in the treated water were comparatively studied. The synthesized hydrogels were also tested for their efficiency of removing Aniline Blue dye by UV-Vis spectrophotometer study. The best grade hydrogel outperformed alum, at extremely low concentration and also showed dye removing efficiency up to 94%. The single step synthesized green products thus exhibited great potential as water purifying agents.

**Keywords:** Natural gum, borate, flocculation, dye removal, adsorption

### 1. Introduction

Development of eco-friendly and effective polymers for water treatment and pollution remediation is need of the hour. Inorganic coagulants such as alum, polyaluminium chloride, ferric chloride, ferrous

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