cbecimat26
26° Congresso Brasileiro de Engenharia e Ciência dos Materiais
22 a 26 de novembro de 2026
Costão do Santinho
Florianópolis-SC

# Chitosan-Based Hydrogel Membranes Containing Modified Brasgel Clay and Alpha-Cyclodextrin for Contaminant Removal

Lucas R. Goncalves[1], Rafaela R. Ferreira[1], Guilherme Manhas Halada[2] and Derval S. Rosa[1]*

[1]Universidade Federal do ABC (UFABC); [2]Universidade do Estado de São Paulo (UNESP)

*dervalrosa@yahoo.com.br

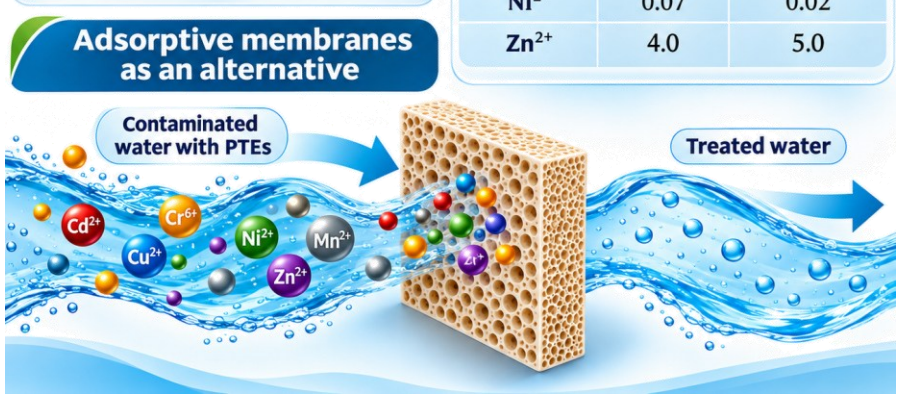
## 1. Introduction




**Target elements and regulatory limits**

Permitted limited in drinking water (mg $L^{-1}$)

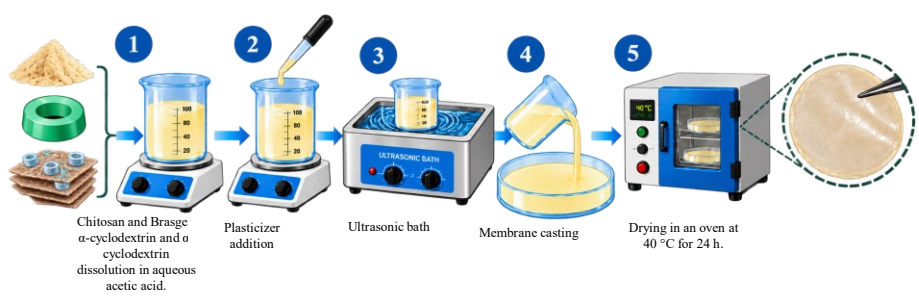
| Element | WHO | CONAMA |
|---|---|---|
| $Cd^{2+}$ | 0.003 | 0.005 |
| $Cr^{6+}$ | 0.05 | 0.05 |
| $Cu^{2+}$ | 2.0 | 2.0 |
| $Mn^{2+}$ | 0.4 | 0.1 |
| $Ni^{2+}$ | 0.07 | 0.02 |
| $Zn^{2+}$ | 4.0 | 5.0 |




## 2. Objective

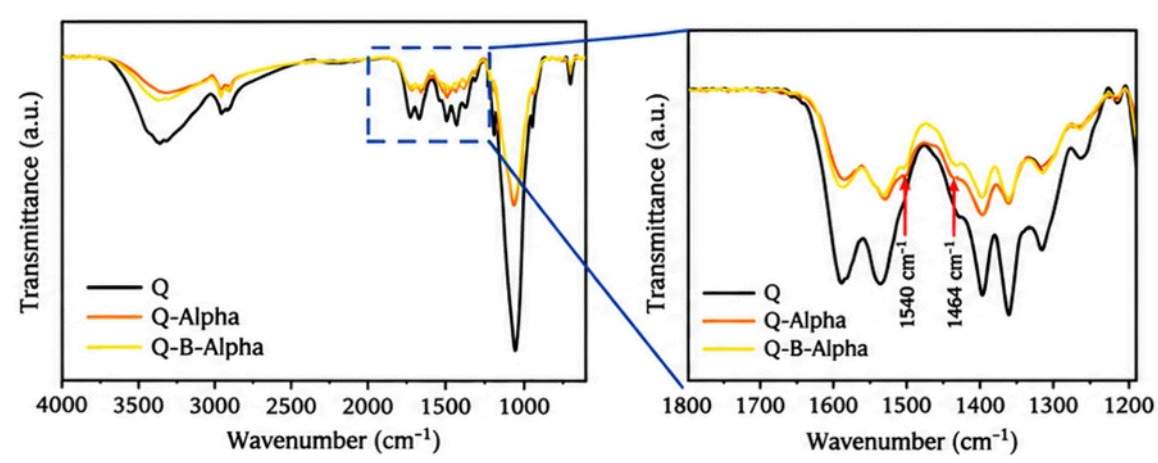
To develop and evaluate chitosan-based hydrogel membranes incorporating α-cyclodextrin and α-cyclodextrin-modified Brasgel clay for the selective removal of metal ions from aqueous multicomponent systems, investigating their structural characteristics, thermal stability, and adsorption performance.

## 3. Materials and Methods

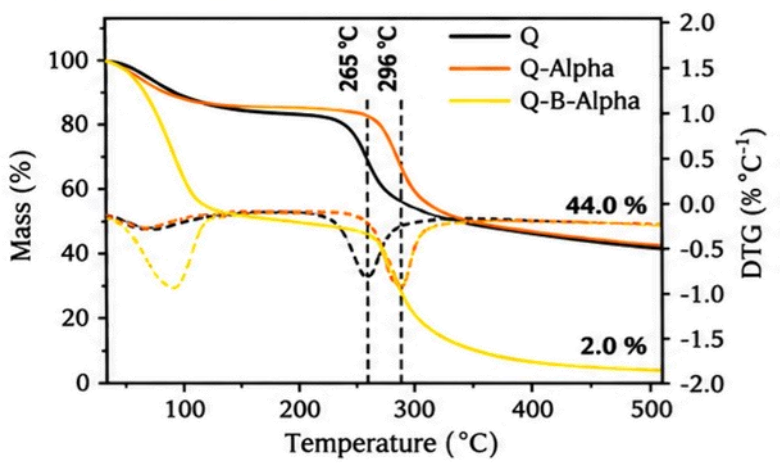



## 4. Results and Discussion

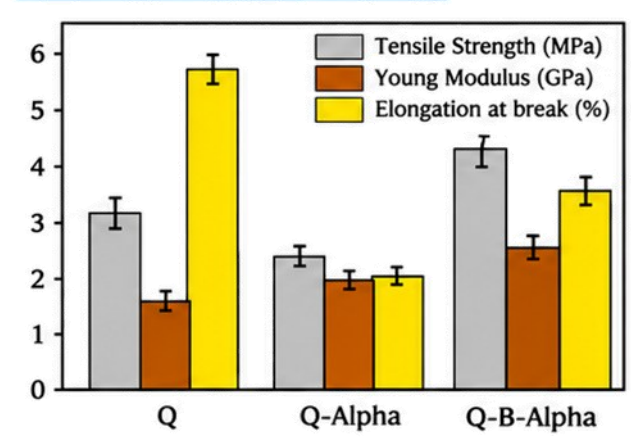
### FTIR



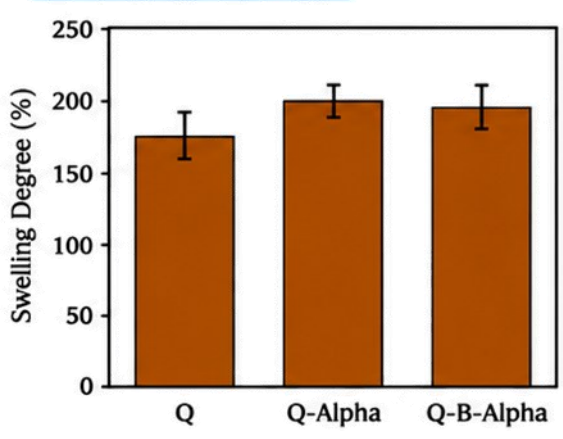

### TGA/DTG



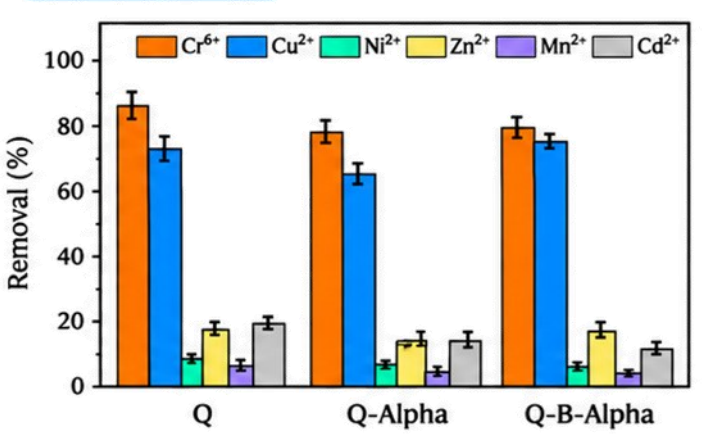

### Mechanical Properties




### Swelling Degree

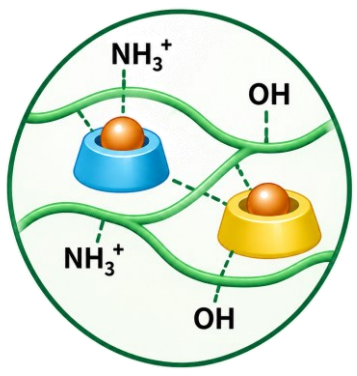



### Adsorption




## 5. Conclusions

**FTIR:** Spectral changes suggest interactions between chitosan and cyclodextrins.
**Thermal stability:** α-Cyclodextrin increased degradation temperature (265 to 296 °C).
**Mechanical properties:** B-α-Cyclodextrin improved strength and stiffness.
**Swelling:** Both Brasgel and α-CD increased swelling, especially α-cyclodextrin.
**Adsorption:** Q showed the highest $Cr^{6+}$ removal, while Q-B-Alpha performed best for $Cu^{2+}$.




UFABC
FAPESP SÃO PAULO RESEARCH FOUNDATION
CNPq Conselho Nacional de Desenvolvimento Científico e Tecnológico
CEM Centrais Experimentais Multiusuários Universidade Federal do ABC
2020/13703-3 | 2021/14714-1 | 2022/01382-3 | 2024/21298-2
132681/2024-2