SIWI
Stockholm *Junior* Water Prize

RAWTRAP
Nano-traps from rice ashes to purify water

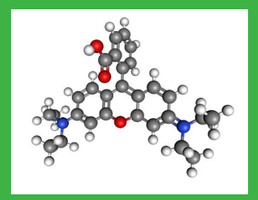
Riva Irene
Caimi Erik

ANALYSIS OF THE PROBLEM

Water is the most precious resource for any nation today. The possibility of having enough of it, with the right purity for the type of use (agriculture or human consumption), is the main objective. In our area, surface water is mainly contaminated with traces of pesticides and heavy metals. The project was born from the need to a path towards environmental sustainability by reducing waste and promoting the reuse of water.

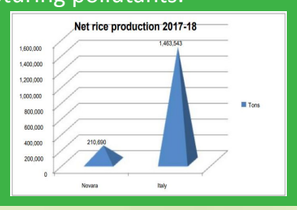
POLLUTION FROM DYES

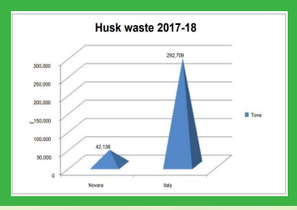
Pollution from dye effluents has become a major environmental problem in the last decade due to the increasing use of dyes in various applications., the global textile industry is the main source of these effluents. The dye that we analysed is Rhodamine B, a dye belongs to the class of xanthenes.



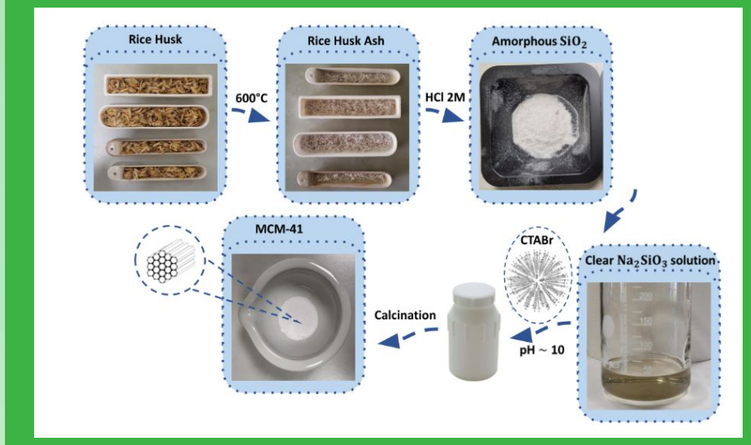
OUR PROJECT

The Rawtrap project was born from the need to address the important issue of water purification, using waste materials from rice production. Specifically, it focuses on the use of rice husk, named **CHAFF**, a waste material rich in silica. This allows us to synthesize nanoparticles called MCM-41 wich are molecular sieve capable of capturing pollutants.



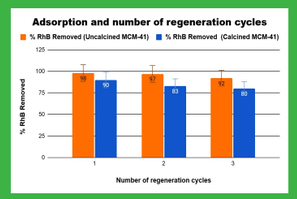


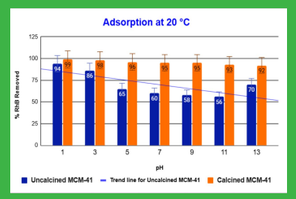
EXPERIMENTAL PROCEDURE

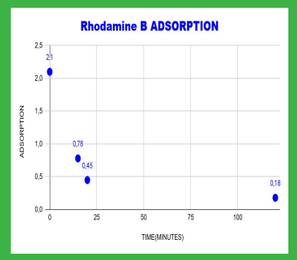


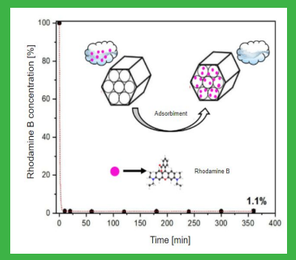
POLLUTANTS CAPTURE TESTS

The experiments were carried out (at room temperature) by dissolving 100 [mg] of MCM-41 in 20 [ml] of a Rhodamine B $2 \cdot 10^{-1}$ [mmol·L^{-1}] solution. The pH of the dye solution is an important parameter in determining the adsorption capacity.

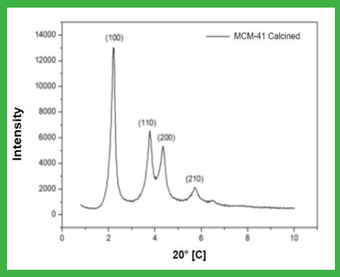


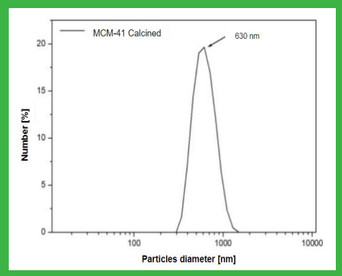


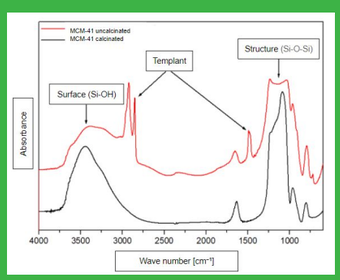


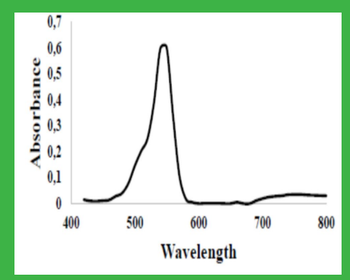


ANALYSIS: EDX, FTIR, DLS, UV-VIS









CONCLUSIONS

Based on the results obtained, it can be concluded that the production of absorbent materials such as MCM-41 according to the principles of Green Chemistry, to be used for purifying wastewater from the textile and dyeing industry, is promising. The best results were obtained with samples of MCM-41 calcined at 700°C.

1. Violeta-Carolina Niculescu,and Maria Simona Raboaca. National Research and Development Institute for Cryogenic and Isotopic Technologies—ICSI, 4th Uzinei Street, 240050 Ramnicu Valcea, Romania; Faculty of Electrical Engineering and Computer Science, Stefan cel Mare University Romania. Faculty of Civil Engineering, Technical University of Cluj-Napoca, Romania. Efficient Rice-Husk-Derived Silica Nanocatalysts for Organic Dye Removal fromWater. Catalysts 2021, 11, 815.
2. Thiago Rodrigo Barbosa Barros, Thianne Silva Batista Barbosa, Tellys Lins Almeida Barbosa, Meiry Gláucia Freire Rodrigues. Federal University of Campina Grande, Academic Unit of Chemical Engineering, Av. Aprígio Veloso, 882-Bodocongó, Zip code 58109-970, Campina Grande-PB, Brazil; Adsorption of Rhodamine-B (RhB) and Regeneration of MCM-41 Mesoporous Silica. Catalysis Research 2023; 3(1).
3. P. Senthil Kumar, K. Ramakrishnan, S. Dinesh Kirupha2and S. Sivanesan. Department of Chemical Engineering, SSN College of Engineering, Chennai, 603 110, India. Environmental Management Laboratory, AC Tech, Anna University, Chennai, India. Thermodynamic and kinetic studies of cadmium adsorption from aqueous solution onto rice husk. Brazilian Journal of Chemical Engineering