

Removal of synthetic dyes from wastewater using rice biomass

Problem statement

Rice is grown in more than 75 countries, with annual paddy production amounting to 80 million tonnes, representing 20% of whole rice.

Executive summary

By using rice husks as a bioadsorbent, tartrazine yellow and brilliant blue FCF (both synthetic azo dyes), among others, are removed from wastewater from the agri-food, textile, leather and paper industries.

Technology description

In general, wastewater contains dye concentrations ranging from 10 to 200 mg/L. In its use as a bioadsorbent, rice husk is ground and sieved in order to obtain homogeneous particle size ($>50\mu\text{m}$). The screenings are washed and dried at 60°C in order to remove adhering organic matter. The adsorption process for both dyes is highly pH-dependent, being favoured at pH 2. The adsorption capacity of rice husk increases with increasing dosage of adsorbent material and initial adsorbate concentration. Regarding the contact time, this is independent of the initial concentration, reaching a constant adsorption after 60min and 90min of contact between the Brilliant Blue FCF and Tartrazine on the rice husk, respectively, for an adsorbent dose of 1.4g. The process is carried out at room temperature.

Market deployment considerations

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Environmental considerations

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Technology feedstock

rice husk

Type of process

grinding

Technology output

purified effluent

Scale

Farm or community

Technology Readiness Level

4

Countries

Portugal

Year

2018

Stakeholder

University

Technology owner/developer

Polytechnic Institute of Leiria

Email:

contact@docplayer.es

Website:

<https://docplayer.es/95515214-Remocion-de-colorantes-sinteticos-de-las-aguas-residuales-de-la-industria-alimentaria-usando-como-material-adsorbente-biomasa-de-arroz.html>



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