Yeast alginate capsules as a new innovative way to decolorize textile effluents

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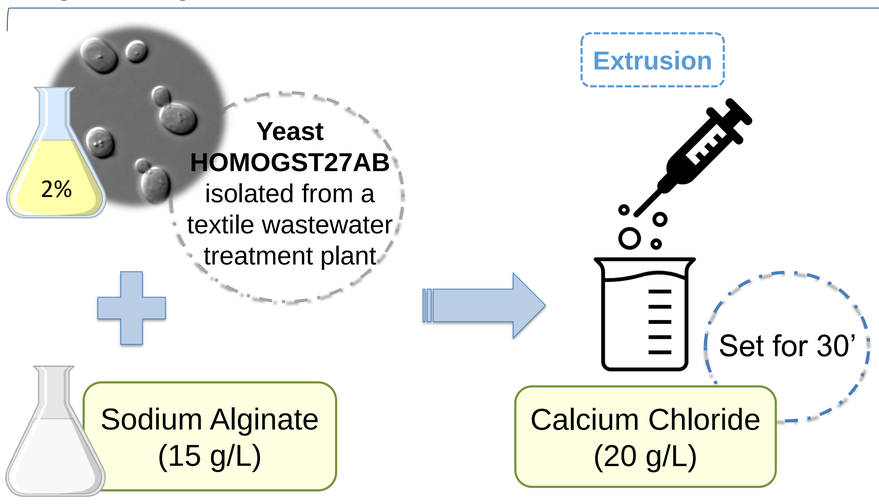
Abstract

Textile industry is a worldwide economic activity that generates high volumes of effluents used in fabric processing that are discharged in the environment causing a potential risk to the aquatic ecosystems [1]. These discharged effluents loaded with synthetic dyes and other chemicals, are resistant to biodegradation and persistent in water, and are responsible for toxicity and mutagenic effects on the aquatic life [2]. Usually, industry uses expensive and harmful chemicals to treat these effluents, which could further generate toxic by-products that are difficult to eliminate. In many countries, these effluents are not even treated before discharge [3].

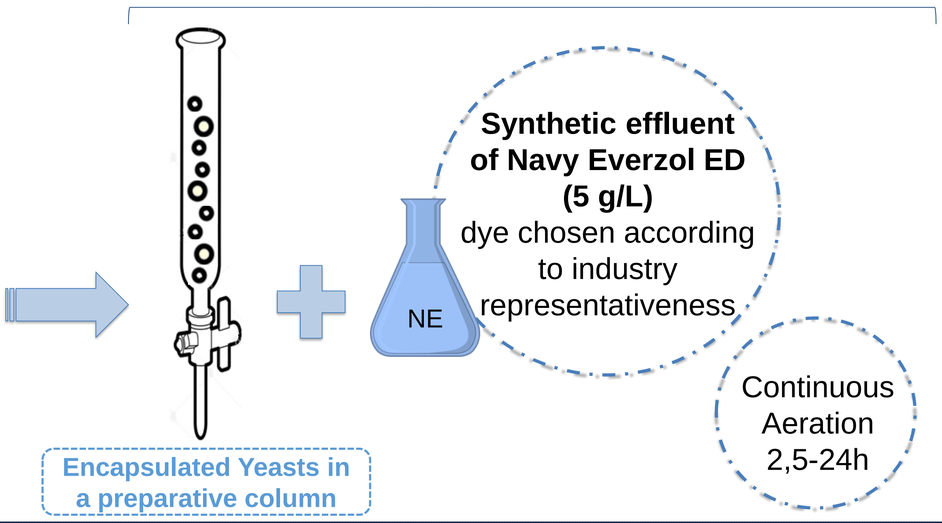
In order to aid and complement the traditional wastewater treatment, this research aims to develop a new and innovative biological solution for the effective decolorization of the textile effluents using alginate-calcium capsules filled with a proven decolorizing yeast.

Methodology

Capsules production



Decolorization experiment



Results

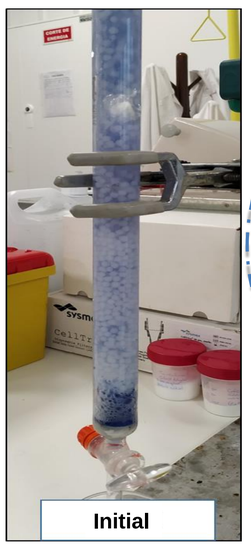


Figure 1 – Decolorization of synthetic effluent Navy Everzol ED (5 g/L) in a preparative column using alginate-calcium capsules with HOMOGST27AB yeast

Table 1 - Characterization of the decolorization cycles carried out using the yeast HOMOGST27AB capsules and synthetic effluent Navy Everzol ED (5 g/L).

Cycles	Medium	Time (h)	Descolorization (%)
1	Effluent Navy Everzol ED	14	100
2	Effluent Navy Everzol ED	24	50
Recovery	Normal Decolorization Medium (NDM)	12	–
3	Effluent Navy Everzol ED	5	100
4	Effluent Navy Everzol ED	12	50
Recovery	Normal Decolorization Medium (NDM)	12	–
5	Effluent Navy Everzol ED + Lactose	2,5	100
6	Effluent Navy Everzol ED + Lactose	2,5	100
7	Effluent Navy Everzol ED + Lactose	5	100
8	Effluent Navy Everzol ED + Lactose	5	50

Decolorization was effective up to 8 cycles with two intermediate recoveries in NDM and addiction of lactose (20 g/L)

References

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Conclusions

- ✓ Alginate-calcium capsules loaded with yeast HOMOGST27AB were still able to decolorize the synthetic effluent Navy Everzol ED after 8 cycles of decolorization;
- ✓ This method proved to be very effective, fast and with the ability to recover and reuse, making possible to carry out several cycles of decolorization.

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