

2nd International Virtual Recycling Event

Global Recycling Day Event around the world where it gets involved

Iron Based Oxides for Remazol Black 5 Azo Dye Degradation

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Introduction

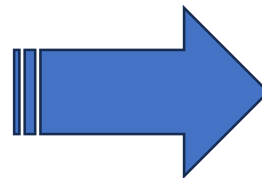
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Pernambuco, Brazil



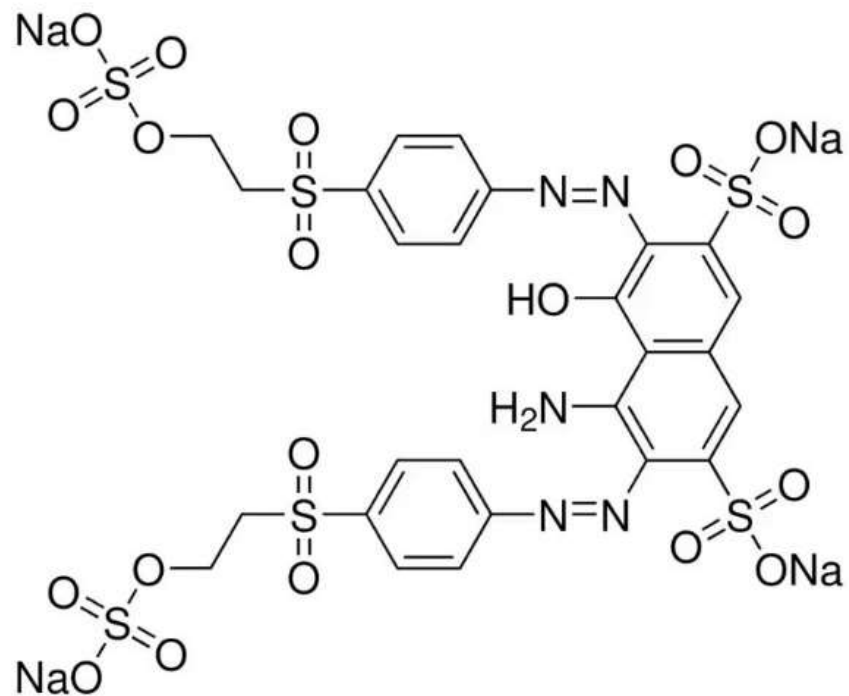
In Pernambuco, Brazil there's a current problem that is the contamination of rivers by the denim dyeing factories



Remazol Black 5 (RB5)



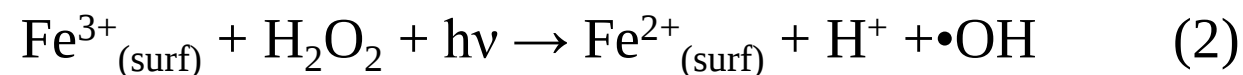
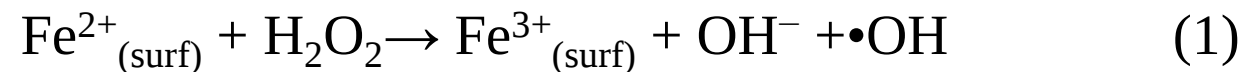
Azo dye contamination on a river at
Toritama, Pe – Brazil (2023)



Remazol Black 5 (RB5)



Photo-Fenton like process



Objective:

Mineralization of RB5 converting it to CO_2 , H_2O , and inorganic salts (sulfates and nitrates) using the photo-Fenton azo dye in the presence of Fe(II)NiFe(III).c catalyst

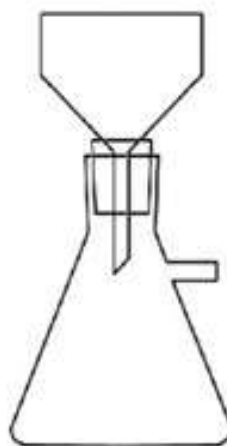
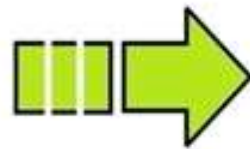
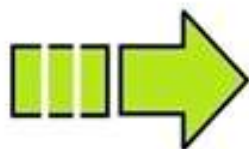


Catalyst Synthesis by co-precipitation at high supersaturation

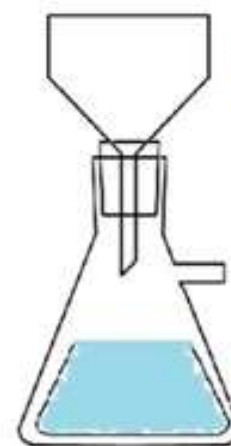
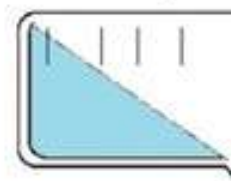
Cations



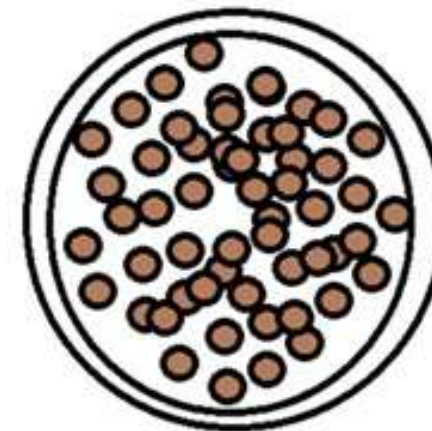
Precipitating agents



*H₂O
until pH7*



**Dried and
calcined**



Fe(II)NiFe(III).c

No pH control;
fast dripping (10 min)

The catalyst is synthesized by dripping the solution with the metals on the precipitating agents, then it is recovered by filtering, washing, and thermal treatment.

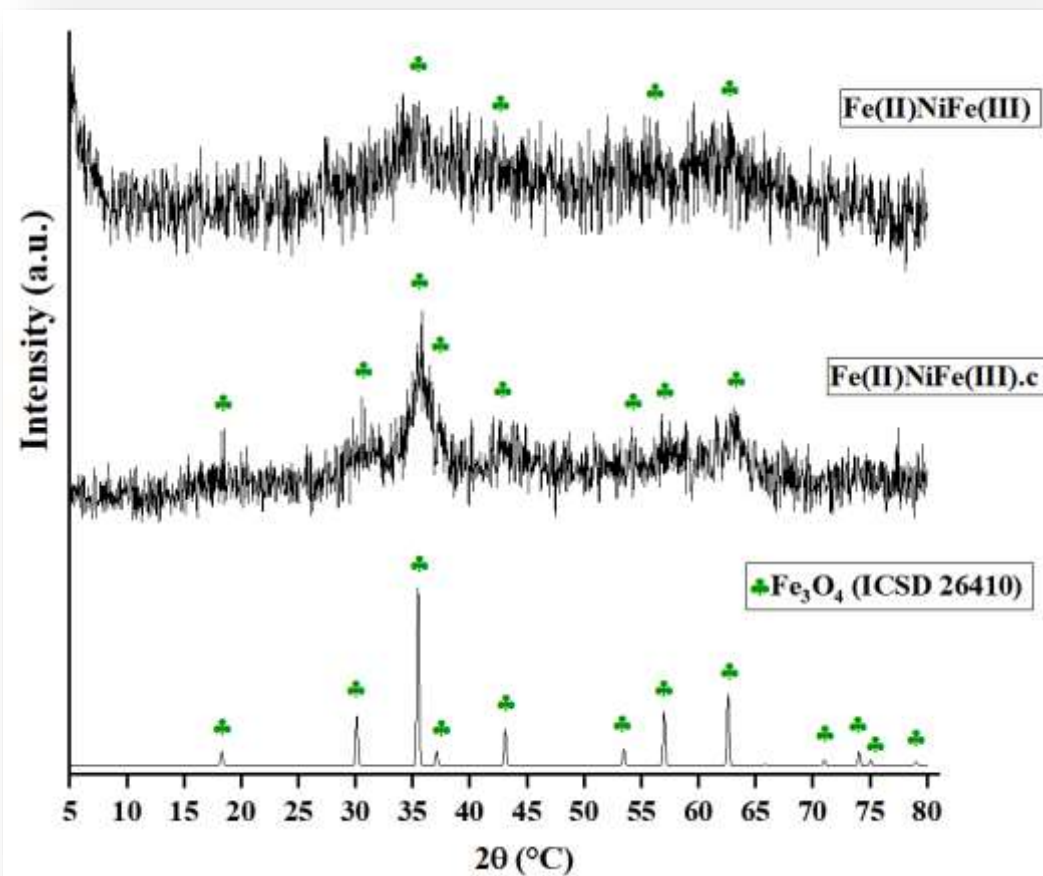


Results and Discussion



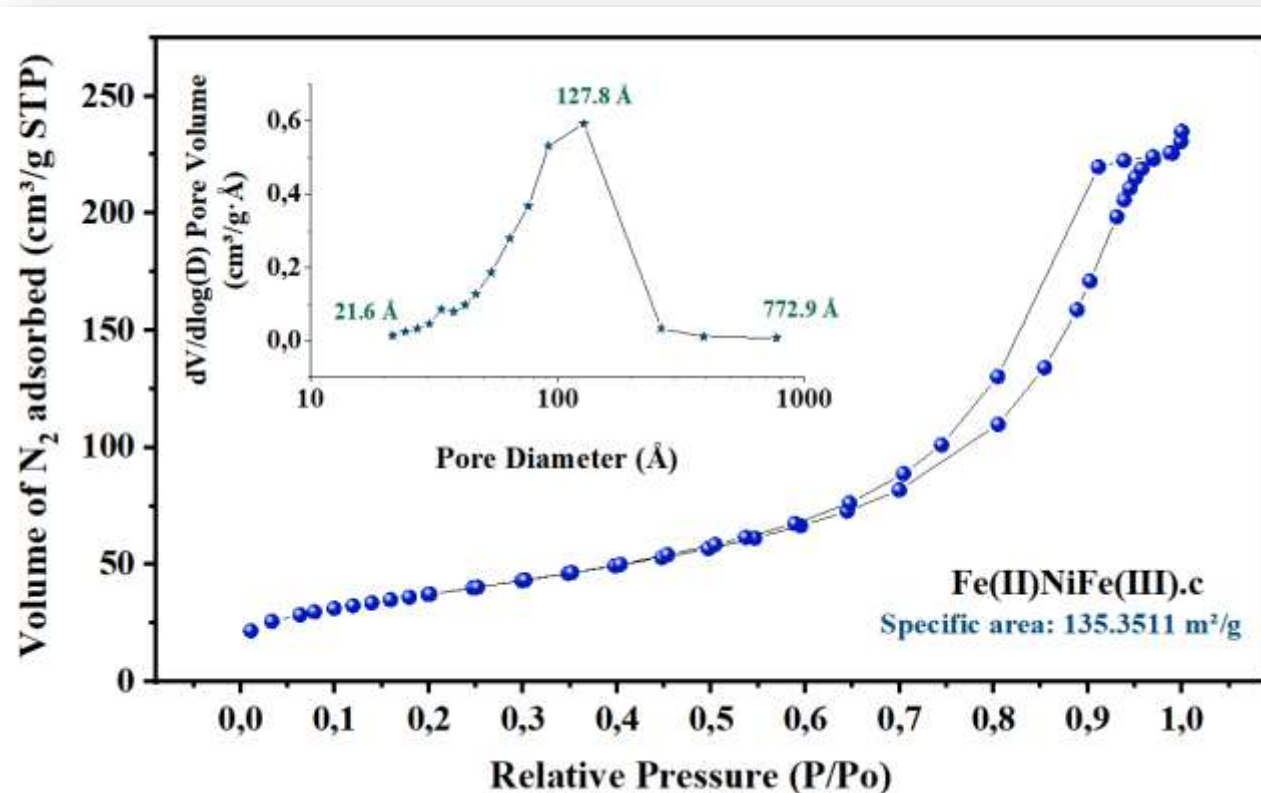
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XRD (structure analysis)



Poor crystalline materials that show similarity with magnetite

Textural analysis (pores study)



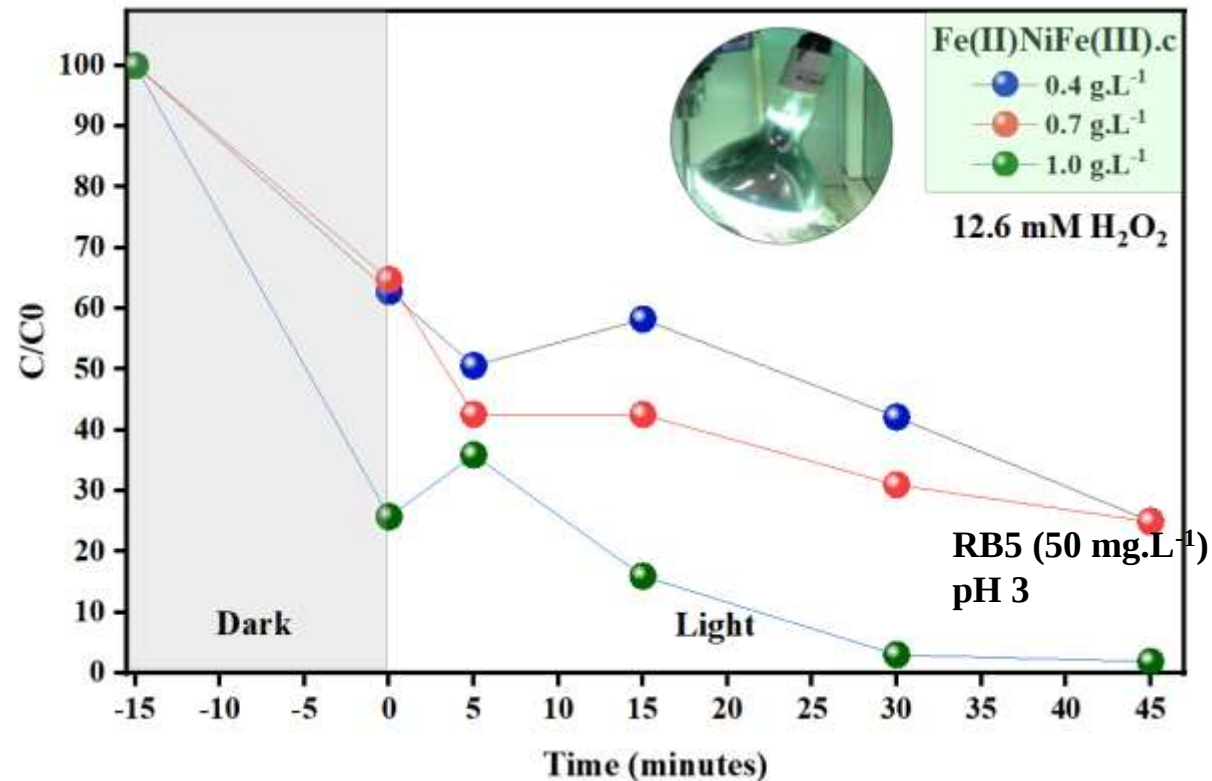
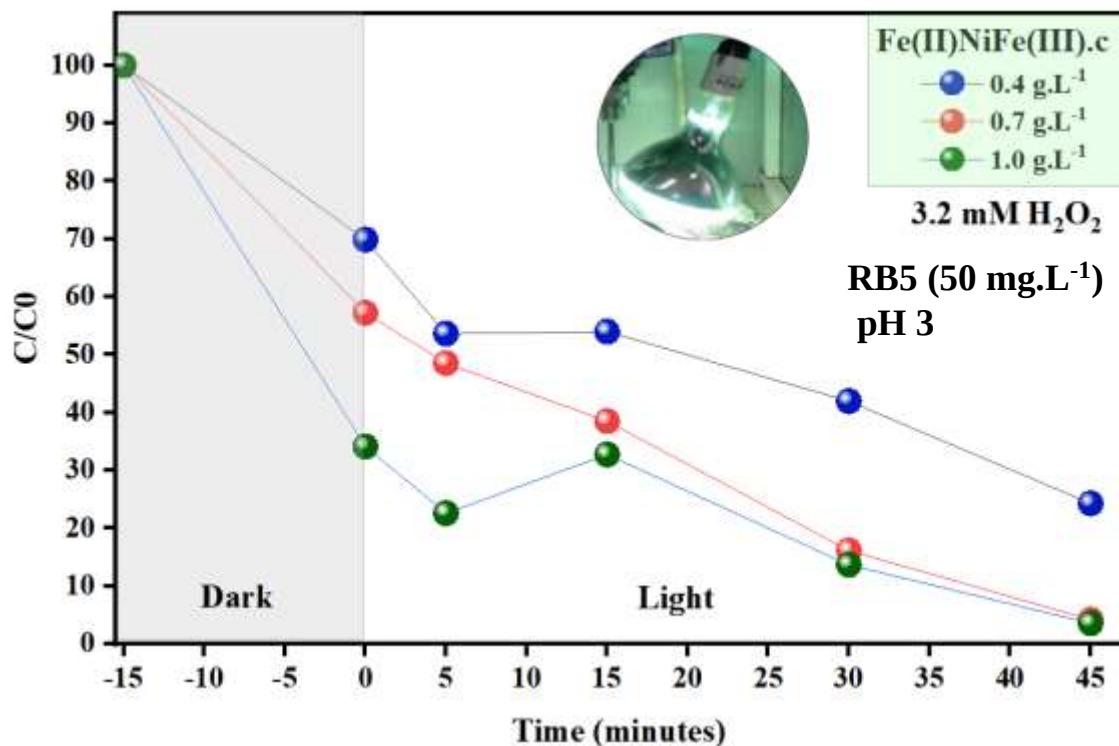
Mesoporous materials with a large superficial area, and a large pore size distribution



Results and Discussion

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Decay on RB5 concentration in the presence of Fe(II)NiFe(III).c catalyst



The concentration of the azo dye was reduced in both set of assys and was favoured when using the smallest amount of hydrogen peroxide (left); While when an excess of hydrogen peroxide can be converted into side products that doesn't help the reaction, as seen on the plot in the right side.

H_2O_2 excess





»»» Conclusions



Fe(II)NiFe(III).c catalyst is mesoporous, and not highly crystalline;



Fe(II)NiFe(III).c catalyst was efficient in the degradation of RB5 azo dye;



The assays show that the degradation was favoured in the presence of 0.7 g.L^{-1} of catalyst content, and the smallest content of H_2O_2 .



» Acknowledgments

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UNIVERSIDADE
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DE PERNAMBUCO



FACEPE

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Thank you very Much for
your attention!

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