Removal of Organic Matter and Salts from Reverse Osmosis Concentrate by a Sequential Electrochemical Treatment

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The context

Over one billion people live in regions with **water shortage**.

Reverse osmosis (RO) is widely used to supplement reused water.

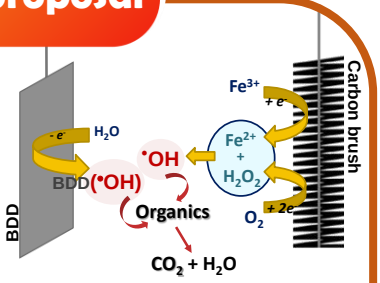
The flipside of **RO** is that it **regenerates a concentrate** charged with organic and inorganic pollutants[1].

Electrochemical technologies have become the new frontier of **efficient and eco-friendly alternatives** for wastewater treatment[2].

Our proposal

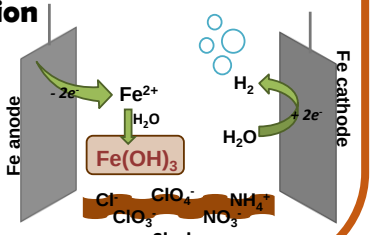
1 Electro-Fenton

Removal of organic matter.

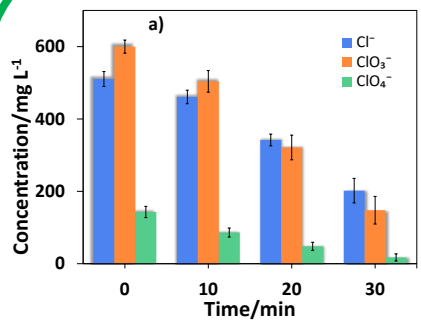


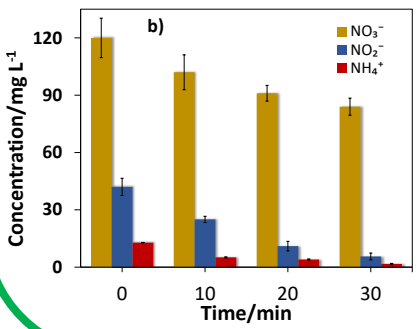
2 Electrocoagulation

Removal of the remaining salts.



Results





1 Electro-Fenton

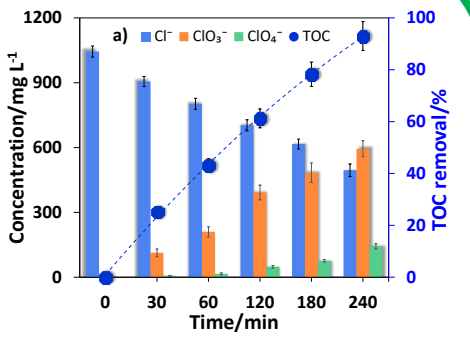
Total removal of the organic matter.

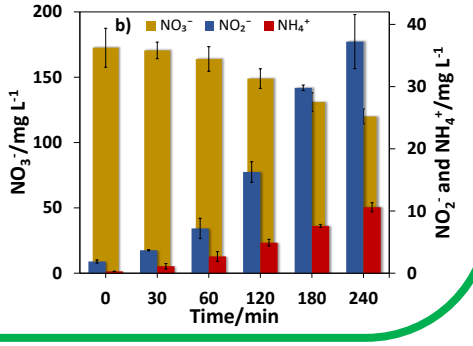
Transformation of the ions initially present into different species.

2 Electrocoagulation

Efficient removal of remaining ions (61%, 75% and 88% of Cl^-, ClO_3^- and ClO_4^- removal, respectively, and 37%, 88% and 87% for NO_3^-, NO_2^- and NH_4^+).

Ions were not removed without electro-Fenton pre-treatment.





Conclusion

This sequential electrochemical process stands as a **promising option for** the **integral treatment of RO concentrate** (organics removal and desalination), with an estimated operational cost of **US$ 8.1 m^{-3}**.

References

1. *J. Environ. Manage.* 150 **(2015)** 322–335.
2. *Crit. Rev. Environ. Sci. Technol.* **(2020)** doi: 10.1080/10643389.2020.1820428