

# Cu(II) cluster based on mixed ligands for drug delivery of diclofenac sodium

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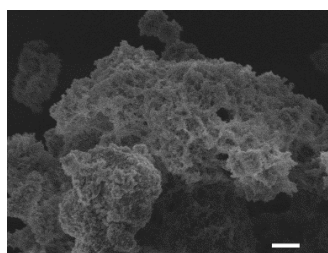
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## INTRODUCTION

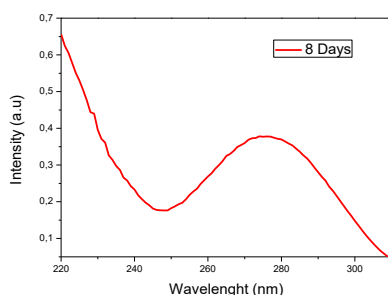
Metal clusters containing two or more organic bridging ligands (mixed ligands) has been adopted to generate new Secondary Building Units (SBUs) giving diversified topologies and interesting properties to MOFs<sup>1</sup>. For biomedical applications, it is important to use biologically compatible metal ions and organic ligands in an attempt to reduce the cytotoxicity<sup>2</sup>. From this perspective, this work describes the synthesis and characterization of a new copper (II) cluster (**1**) based on adenine and 4,4'-biphenyldicarboxylate linkers. The adsorption and delivery of diclofenac sodium (DS), a very usual non-steroidal anti-inflammatory drug with a short half-life *in vivo* (1-2 h), have been investigated.

## RESULTS AND DISCUSSION

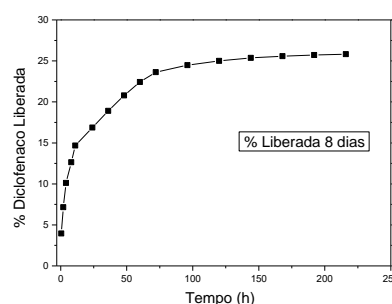
The compound obtained in this work is a novel copper(II) cluster (SBU) containing two different ligands in the same coordination sphere. It was possible to obtain a material with pores on its surface (see FEG-SEM image shown in Figure 1) that makes it a potential drug carrier. In this context, the encapsulation of diclofenac sodium in the pores of **1** was investigated. The Figure 2 shows the electronic spectrum of free diclofenac (in the supernatant) from which it was possible to determine the drug encapsulation efficiency. The results revealed that **1** load 1.84 mg of diclofenac by milligram of the cluster. The release profile of diclofenac from **1** was studied in PBS buffer pH 7.4. Figure 3 shows that steady diclofenac release was observed over the course of 6 d (144 h) and can be attributed to the physically adsorbed drug molecules. The copper compound exhibited a low release capability (~26%) suggesting the existence of stronger (probably coordination bonds) adsorbate-adsorbent interactions.



**Figure 1:** FEG-SEM image of (**1**), 10.000x/1µm



**Figure 2:** UV spectrum of diclofenac in the supernatant.



**Figure 3:** Release profile of diclofenac from **1**.

## CONCLUSION

We have shown the obtention of a new mixed ligand copper SBU that exhibits very high load capacity (around 55.4 wt%) and low release capability (26%) for diclofenac sodium.

## REFERENCES

- 1- Lin, H.; Luan, J.; Wang, X.; Zhang, J.; Liu, G.; Tian, A.; *RSC Adv.* **2014**, 4,62430.
- 2- Venkatesh, V.; Pachfule, P.; Banerjee, R.; Verma, S.; *Chem. Eur. J.* **2014**, 20, 12262.