A review on the Removal of Pharmaceutical Wastes from Aqueous Solutions under the Effect of Different Nanocomposite Catalysts of Sonocatalytic Degradation

Murat KIRANŞAN[a,*]

[a] *Department of Chemistry and Chemical Processing Technologies, Gümüşhane Vocational School, Gümüşhane University, 29100 Gümüşhane*

**E-mail: murat.kiransan@gumushane.edu.tr*

Since the beginning of the 21st century, many publications have revealed the presence of drug and dyes waste on the surface and in wastewater [1]. Meloxicam, one of the micro-pollutants, has been found to be at a level that can create potential toxicological risks to living organisms, even at low concentrations in wastewater [2]. Most of the pharmaceuticals are not biodegradable and their degradation intermediates are more hazardous, therefore they must be removed from water environments or reduced to appropriate levels [3]. Compared to traditional processes, the sonocatalytic degradation method has many advantages, such as easy handling, strong disintegration of waste and cheap cost [4]. In general, true antibiotics have high concentration and deep color properties for wastewater. In recent studies, the application of the sonocatalytic degradation process has received intense attention [5]. Removal of pharmaceutical compounds by conventional wastewater treatment methods is limited due to their resistance to physical, chemical and biological treatments at low concentrations [6]. Diclofenac is the most common pain reliever and most commonly used anti-inflammatory drug in the United States [7]. Processes such as ultrasonic treatment, ozonation and photocatalysis with semiconductors are AOPs with high oxidation potential, producing highly reactive hydroxyl radicals for the decomposition of organic pollutants [8].

References

1) Jimenez, J.J.; Munoz, B.E.; Sanchez, M.I.; Pardo, R. *Chemos*. **2018**, 191, 903-910.
2) Xu, L.; Wang, X.; Xu, M.L.; Liu, B.; Wang, X.F.; Wang, S.H.; Sun, T. *Ultrason. Sonochem.* **2020**, 61, 104815.
3) Rad, T.S.; Khataee, A.; Kayan, B.; Kalderis, D.; Akay, S. *J. Clean. Produc*. **2018**, 202, 853-862.
4) Zhang, H.; Qiao, J.; Li, G.; Li, S.; Wang, J.; Song, Y. *Ultrason. Sonochem.* **2018**, 42, 356-367.
5) Wang, G.; Li, S.; Ma, X.; Qiao, J.; Li, G.; Zhang, H.; Wang, J.; Song, Y. *Ultrason. Sonochem.* **2018**, 45, 150-166.
6) Al-Hamadani, Y.A.J.; Lee, G.; Kim, S.; Park, C.M.; Jong, M.; Her, N.; Han, J.; Kim, D.H.; Yoon, Y. *Chemos*. **2018**, 205, 719-727.
7) Lonappan, L.; Brar, S.K.; Das, R.K.; Verma, M.; Surampalli, R.Y. Environ. Int. **2016**, 96, 127-138.
8) Karaca, M.; Kıranşan, M.; Karaca, S.; Khataee, A.; Karimi, A. *Ultrason. Sonochem.* **2016**, 31, 250-256.