

STUDIES ON PHOTOCATALYTIC ACTIVITY OF ONE DIMENSIONAL COORDINATION POLYMERS BASED ON SCHIFF BASE LIGAND

Ildiko Mariana Bută, Maria Andreea Nistor, Simona Gabriela Muntean

Romanian Academy "Coriolan Dragulescu" Institute of Chemistry, 24 Mihai Viteazu Bvd.,
300223-Timisoara, Romania
e-mail: ildiko_buta@acad-icht.tm.edu.ro

In recent decades, design and synthesis of new materials with photocatalytic properties draw attention in scientific research. Water pollution caused by the presence of non-biodegradable dyes, widely used in the textile and paper industry, has expanded with the increase of industrialization and population [1].

Here, we report the investigation of photocatalytic properties of cadmium(II) and copper(II) coordination polymers: $^1_\infty[\text{Cd}_3\text{L}(\text{CH}_3\text{COO})_4]\cdot\text{H}_2\text{O}$ (**CP1**), $^1_\infty[\text{Cd}_2\text{L}(\text{NO}_3)_2]\cdot\text{CHCl}_3$ (**CP2**), $^1_\infty[\text{Cd}_5\text{L}_2(\text{CH}_3\text{COO})_6]$ (**CP3**), $^1_\infty[\text{Cu}_3\text{L}_2(\text{NO}_3)](\text{NO}_3)\cdot 2\text{MeOH}\cdot 2\text{H}_2\text{O}$ (**CP4**), $^1_\infty[\text{Cu}_3\text{L}_2(\text{N}_3)](\text{CH}_3\text{COO})$ (**CP5**) and $^1_\infty[\text{Cu}_3\text{L}_2(\text{H}_2\text{O})](\text{ClO}_4)_2$ (**6**) based on the Schiff base H_2L (N,N'-bis[(2-hydroxybenzylideneamino)propyl]piperazine) [2] for degradation of industrial dyes. Congo Red (CR), Acid Orange 7 (AO7), Methyl Orange (MO), and Direct Green 6 (DG6) dyes were selected as potential colored pollutants. Photocatalytic experiments were carried out under visible irradiation at 546 nm, and room temperature using 1 g/L compound (**CP1** ÷ **CP6**).

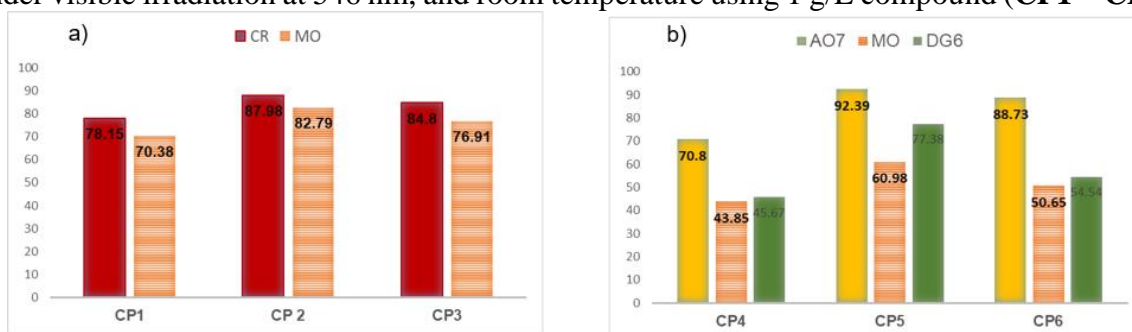


Figure 1. Degradation efficiency of investigated dyes using (a) Cd^{II} -CP and (b) Cu^{II} -CP

Under irradiation with visible light, catalytic efficiency for the degradation of investigated dyes increased in order: **CP1** < **CP3** < **CP2** using Cd^{II} -CP and **CP4** < **CP6** < **CP5** for Cu^{II} -CP. The highest photocatalytic activities were obtained using **CP2**: 87.98% for CR, and 82.79% for MO, and **CP5**: 92.39% for AO7, 40.98% for MO, and 77.38% for DG6.

The kinetic of dyes photodegradation was investigated using the Langmuir-Hinshelwood model and the obtained results showed that the degradation process followed a pseudo-first-order kinetic.

Acknowledgements

This work was supported by Project 4.1.3 and Project 2.2 of the "Coriolan Drăgulescu" Institute of Chemistry.

References

- [1] M. A Hassaan, A. El Nemr, AJESE 1 (2017) 64-67.
- [2]. (a) I. Buta, A. Ardelean, L. Peter, G. Novitchi, E. Hey-Hawkins, M. Andruh, O. Costisor Polyhedron 190 (2020) 114766; (b) I. Buta, M. A. Nistor, P. Lönnecke, E. Hey-Hawkins, S. G. Muntean, O. Costisor J. Photochem. Photobiol. A 404 (2021) 112961.