

### Photocatalytic decolorization kinetics of yellow pyocyanine in the presence of a nanocomposite powder at the various buffer and non-buffer pHs

Morteza Montazerzohori,\*Shahbaz Rakhshan and Mohammad Hosein Habibi

Department of Chemistry, Yasouj University, Yasouj, Iran (e-mail: mmzohori@yu.ac.ir)

Wastewater from textile industries insert a large amount of chemically different materials as organic or inorganic pollutant into the environment due to industrial applications and a significant proportion of these compounds. Around 10-15% of all the dyes used in the industry are lost within wastewater during synthesis and processing [1]. Different techniques have been used for treatment of contaminant effluents [2,3], but the most of these methods are ineffective and there is a need to develop more effective treatment methods in eliminating dyes from the wastewater [4,5]. A suitable method for removal of pollutants from water is use of non-toxic photocatalyst like nano-metal oxide semiconductors for mineralization of organic contaminants to carbon dioxide, water and mineral acids [6,7].

In this research, the catalytic activity of zinc zirconate nano-powder was investigated for degradation of yellow pyocyanine dye under 400 W high pressure mercury lamp under aerobic conditions at room temperature at buffer and non-buffer pHs. The decolorization process was monitored by spectrophotometrical method. The effects of UV light, buffer and non-buffer pHs, irradiation time and nano-photocatalyst amount were studied. The photocatalytic degradation of dye was found to behave as a first order reaction. Kinetic investigation of photodegradation of yellow pyocyanine dye, showed that the reaction obey from improved Langmuir-Hinshelwood (L-H) model. Based on L-H model, rate constant and L-H adsorption constants at all media were evaluated.

#### References:

- [1] T. Robinson, G. McMullan, R. Marchant, P. Nigam, *Bioresource Technology* 77 (2001) 247.
- [2] S. Ledakowicz, M. Solecka, R. Zylla, *Journal of Biotechnology* 89 (2001) 175.
- [3] D. Georgiou, P. Melidis, A. Aivasidis, K. Gimouhopoulos, *Dyes and Pigments* 52 (2002) 69.
- [4] M. H. Habibi, R. Sheibani, *Journal of Industrial and Engineering Chemistry* 19 (2013) 161.
- [5] S. Jeon, J. Yun, Y.-S. Lee, H. Kim, *Journal of Industrial and Engineering Chemistry* 18 (2011) 481.
- [6] Y. C. Lin, S. H. Liu, H. R. Syu, T. H. Ho, *Spectrochim Acta: Part A* 95 (2012) 300.
- [7] M. R. Hoffmann, S. T. Martin, W. Choi, D. W. Bahnemann, *Chemical Reviews* 95 (1995) 69.