

Accepted Manuscript

Modeling and optimizing Acid Orange 142 degradation in aqueous solution by non-thermal plasma



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PII: S0045-6535(18)31251-7

DOI: 10.1016/j.chemosphere.2018.06.176

Reference: CHEM 21708

To appear in: *Chemosphere*

Received Date: 07 May 2018

Accepted Date: 29 June 2018

Please cite this article as: Alaa Fahmy, Adham El-Zomrawy, Ahmed M. Saeed, Ahmed Z. Sayed, Mohamed A. Ezz El-Arab, Hassan A. Shehata, Modeling and optimizing Acid Orange 142 degradation in aqueous solution by non-thermal plasma, *Chemosphere* (2018), doi: 10.1016/j.chemosphere.2018.06.176

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1 **Modeling and optimizing Acid Orange 142 degradation**
2 **in aqueous solution by non-thermal plasma**

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8
9 **Abstract**

10 The effects of the high voltage electrode material, initial pH of the
11 solution, initial concentration of Fe^{2+} , and time of plasma treatment on the
12 efficiency of Acid Orange 142 (AO142) degradation were studied and evaluated.
13 Furthermore, based on the Box–Behnken response surface methodology (BBD-
14 RSM), a model between response (decolorization efficiency %) and influencing
15 factors was proposed to estimate the interactive effects and optimize the process
16 conditions. The proposed model was adequate with an R^2 of 0.8005 which is in
17 reasonable agreement with the R^2_{adj} of 0.9307. According to the model, the
18 optimum conditions were steel as a high voltage electrode, an initial pH 3.0, an
19 initial Fe^{2+} concentration 0.9 mM, and 20 min time of treatment to obtain a
20 decolorization efficiency of 95.05%. In addition, the analytical results of UV-
21 Vis, FT-IR, TOC and GC-MS indicated the degradation of the dye molecule.

22 **Keywords:** water treatment; advanced oxidation process; plasma discharge; optimization;
23 hydrogen peroxide.

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