APPLICATION OF FENTON METHOD FOR HANDLING ORGANIC SUBSTANCES

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1. The scientific basis of the Fenton reaction

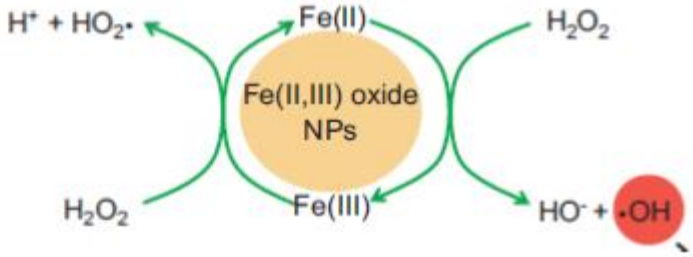
Fenton reaction is used as an effective and popular solution in handling organic toxins. The key to this application is to rely on the potential of hydroxyl (• OH) radicals at a potential (E0 = 2.8V) from the reaction between iron II and hydrogen peroxide (H2O2) to destroy CH bonds. The final product is CO2. The reaction that produces hydroxyl radical is as follows (1-3):

Fe2 + + H2O2 g Fe3 + + • OH + OH- (1)

Fe3 + + H2O2 g Fe2 + + H + + HO2 • (2)

• OH + R g CO2 (3)

2. New technology point



According to Sakai et al (2010), aquatic plants in the tropics contain high levels of endogenous H2O2

According to Rusevova et al (2012), the iron source used in Fenton reaction is supplemented by Fenton and Fenton-like reactions. Fe3O4 iron nanoparticles with Fe (II) and Fe (III) components are one of the most effective materials in the environment.

Figure 1. New point in applying advanced Fenton technology

1. Materials and methods of implementation

The plants used in this study are Vetiver grass (Vetiveria zizanioides), a tree with a bulky root system, high biomass, well adapted to tropical and subtropical climates, which is resistant to High with adverse environmental conditions, the ability to branch up to 20-30 branches / cluster. The material source is purified at the Arboretum dealing with environmental pollution, Department of Environment, Vietnam National University of Agriculture.

- DDT contaminated soil source is taken from the plant protection chemical warehouse in Yen Dung district, Bac Giang province, with the DDT content exceeding 6 times the maximum allowed limit in QCVN 15: 2008 / BTNMT.
- The iron catalyst used in the study to form Fenton reaction includes 2 types: nano iron from Fe3O4 and Fe (II) -EDTA complex. Study the effect of different types of catalysts with 10 mg / kg soil and 50 mg / kg soil.

Figure 2. Evaluation of vetiver growth under experimental conditions

1. The results

- Vetiver is able to grow well in the presence of DDT, iron catalyst and Fenton reaction. In conditions of high iron content (50 mg / kg of soil), vetiver showed symptoms of slow growth.
- In the absence of iron catalyst supplement, DDT decomposition process reached 19.87% compared to the original concentration. When adding iron catalyst at 50 mg / kg, treatment efficiency reached 84.79% for Fe3O4 and 84.46% for Fe (II) -EDTA.