PG-29

Highly Efficient Degradation of 2,4-Dichlorophenoxy Acetic Acid and Related Compounds Using Polyaniline / O_2 System

*Teppei Suzuki, Naoki Akiyama, Akira Osakaya, Satoshi Kawabata, and Kiyoshi Saito**

Department of Functional Materials Science and Engineering, Faculty of Engineering, Toin University of Yokohama, Japan

Presently, there is growing concern over environmental dispersion of endocrine disrupting chemicals (EDCs), which are regarded as exogenic substances that affect the hormone systems of wild oroanisms and fetuses. The present authors have previously found that polyaniline (PAn) reacts with oxygen to generate superoxide,[1] and have examined continuous generation of active oxygen in aqueous systems in the process of electrochemical reduction of PAn. On the other hand, we have already reported the decomposition of EDCs having aromatic ring moiety such as bisphenol A and diethyl terephthalate using this system.[2] The object of the present study is to examine the degradation of 2,4-dichlorophenoxy acetic acid (**1**) and salicylic acid (**2**) as model compound.

Active oxygen was generated by immersing the PAn electrode (as the WE) and a titanium plate surrounded by a diaphragm (as the CE) in the electrolyte (physiological saline) and applying a fixed potential of -0.35V vs. SCE. The oxidative degradation of 1 and 2 was done by 25℃ by adding a catalytic amount of iron chloride. The reaction was followed by taking the UV spectra at different time and the confirmation of products was carried out by IR and NMR spectra.

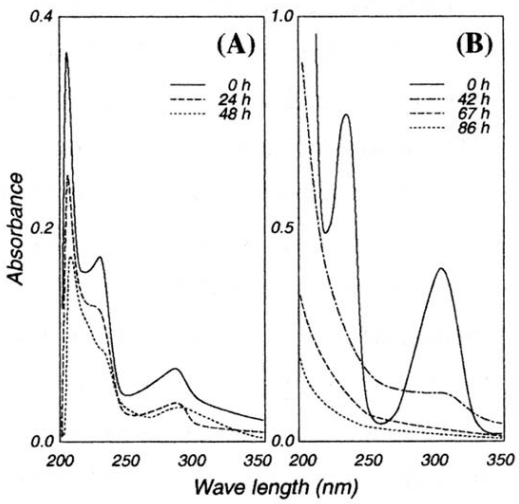
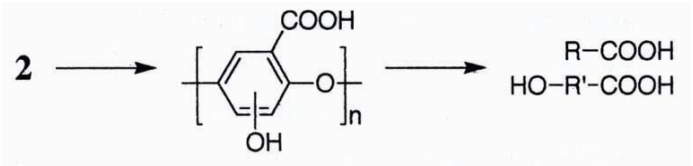


Figure. The comparison of the absorbance of 1 (A) and 2 (B) at different time.

The changes in the UV spectra of the substrates before and after reaction are shown in Figure. As is clear from this figure, the absorbance due to the aromatic ring decreased significantly both **1** and **2**. In addition, it was proved that 2 was decomposed to various kind of hydroxy acids through a oxy-14-phenylen oligomer (scheme).

In the reaction of the present study, the only reagents added are the electrolyte and the catalytic amount of iron chloride. The only energy required is the small potential used to reduce the PAn. This reaction thus has the potential to serve as a clean, energy- saving form of water treatment.



Scheme

References

1) S. Otsuka, K. Saito and K. Morita, *Chem. Lett*., **1996**, 615.

2) K. Saito et al., *Environ. Sci*.**8**,304(2001).