DEGRADATION AND MINERALIZATION OF BISPHENOL A BY THE PHOTO FENTON PROCESS

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Introduction

✓ Fenton and Photo-Fenton degradation of Bisphenol A (BPA) samples (0.5 L, 30 mg L⁻¹) is addressed.
✓ 2² experimental design with star points is used for characterizing the influence of two Fenton reagent with and without light source presence.
✓ BPA and TOC concentration profiles are the response of the studied process.
✓ A semi-empirical model is used for characterizing the process performance.

\[ \xi = \xi_{\text{max}} \left( 1 - e^{-kt} \right) \]
\[ \xi_{\text{max}} = \frac{[\text{TOC}]_0 - [\text{TOC}]_{\text{me}}} {[\text{TOC}]_0} \]

Experimental Methods

Solution samples:
BPA: 0.5 L, 30 mg L⁻¹ or 1.31·10⁻¹ mM
H₂O₂: (2.37-6.41) mM, Fe(II): (1.42·10⁻² - 3.92·10⁻²) mM
Temperature = 25 ± 0.5 ºC, pH = 3 ± 0.2
Batch reactor: thermostatic cylindrical 500 mL Pyrex cell
Irradiation source: sunlight lamp (Ultra-Vitalux®, Osram, 300 W)
Incident photon flux: 7.09x10⁻⁵ Einstein min⁻¹.

Results & Discussion

Preliminary screening to evaluate presence and absence of irradiation
H₂O₂ stoichiometric dose: 161 mg L⁻¹, 80.50 – 201.25 mg L⁻¹, Fe(II) 5 – 10 mg L⁻¹

Evaluation of the Photo-Fenton process

When stoichiometric H₂O₂ is supplied (161 mg L⁻¹):
- Increasing Fe(II) load increases the reaction rate (50 percentage points when using 11 mg L⁻¹ Fe(II) instead of 3.96 mg L⁻¹).
- The highest conversion rates are obtained with the appropriate iron load (i.e. total BPA elimination and 90 % TOC decay).

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