



## Thermodynamic and aquatic photodegradation of herbicide butachlor

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### ABSTRACT

Thermodynamic and aquatic photodegradation kinetics of a chloroacetamide herbicide (butachlor), subjected to irradiation of ultraviolet light under different temperatures (20–50°C), were investigated. Butachlor residues were determined using gas chromatography coupled with micro-electron capture detector (GC-ECD). The results showed that photochemical reaction of butachlor in water under UV light followed the first order kinetic equation, and the photodegradation efficiency was increased with temperature in the range of 20–50°C. Photodegradation rate constants of butachlor exposed to temperatures of 20, 30, 40, and 50°C were 0.004, 0.007, 0.041, and 0.12 h<sup>-1</sup> and their half lives were 175, 100, 17.5, and 5.8 h, respectively. Activation thermodynamic parameters were determined for the degradation process. The reaction activation energy was calculated to be 11.7 kJ mol<sup>-1</sup>. Results proved that the use of UV irradiation with increasing temperature is a good application to eliminate butachlor from contaminated water.

*Keywords:* Thermodynamic; Photodegradation; Herbicide; Butachlor

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