

US EPA ARCHIVE DOCUMENT

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DATA EVALUATION RECORD

STUDY IDENTIFICATION:

Batzer, F.R., et al. 1990. Aqueous photolysis of chlorpyrifos. North American Environmental Chemistry Laboratory, DWElanco, Midland, MI, GH-C 2417, Nov 12, 1990. ,MRID #41747206.

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TYPE OF STUDY: Photodegradation in Water (161-2)

CONCLUSION:

1. The EFGWB concludes that the study is acceptable and fulfills the data requirement.
2. The results of the study indicate that 2,6-¹⁴C-chlorpyrifos (0.5 and 1.0 ppm) photodegraded in buffered solutions (pH 7 and 25 C) with a half-life of 29.6 days when exposed to natural sunlight. These half-lives were based on a mid-summer day at 40 deg north latitude. The dark control (hydrolysis) had a half-life of 74 days. Many photoproducts were formed in the irradiated, buffered solutions (see Table XXIV); however, none were more than 5% of the applied activity.

MATERIALS AND METHODS:

2,6-¹⁴C-chlorpyrifos (radiopurity of 98.2%) was tested for aqueous photolysis in buffered solutions (pH 7, 25 C) by exposure to light from a Rayonet photoreactor (chlorpyrifos at 1.0 ppm) and natural sunlight (chlorpyrifos at 0.5 ppm). The solutions were prepared with 0.25% (or less) acetonitrile. The Rayonet system was quipped with phosphor-coated mercury lamps (Model RPR-3500A) that absorb light in the region of 290-400 nm.

Chlorpyrifos absorbs light in the 290-320 nm region. The photoreactor chamber simulated light conditions on a mid-summer day at 40 deg north latitude. Sampling was on day 0, 2, 7, 14, and 21 for the Rayonet irradiation and through day 30 for sunlight. Four repetitions of the Rayonet photolysis, which differed slightly in experimental set-up, were conducted. The UV absorption spectrum of chlorpyrifos is shown in Fig. 2 and the emission spectrum of the Rayonet lamp is shown in Fig. 6. Analysis was by LSC (liquid scintillation counting), HPLC (high performance liquid chromatography), and GC/MS (gas chromatography/mass spectrometer).

REPORTED RESULTS:

The data are summarized in Tables XXIV, XXVII, and Figures 2, 3, 5, 6, 8, 13, 15, 16, and 17. The findings may be summarized as follows:

1. Chlorpyrifos photodegraded with half-lives of 29.6 days when exposed to natural sunlight and 30.7 days when exposed to the Rayonet light source. The dark control (hydrolysis) had a half-life of 74 days.
2. There were many photodegradation products, but none exceeded 5% of applied radioactivity (see Table XXIV).
3. The material balance of the various experiments averaged 100.5%, with a range of 93.7 to 107.6%.

DISCUSSION:

1. The study is acceptable and fulfills the Photodegradation in Water (161-2) data requirement.

STUDY TITLE

AQUEOUS PHOTOLYSIS OF CHLORPYRIFOS

DATA REQUIREMENT

158.290 Guideline 161-2

AUTHOR

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STUDY COMPLETED ON

November 12, 1990

PERFORMING LABORATORY

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LABORATORY PROJECT ID

GH-C 2417

PROTOCOL NO.

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