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DATA EVALUATION RECORD

STUDY 1

CHEM 128974

Quinclorac

§161-2

FORMULATION--00--ACTIVE INGREDIENT

STUDY MRID 41781402

Ellenson, J.L. 1991. Photolysis of ¹⁴C-BAS 514 H in water sensitized with hydrogen peroxide. BASF Protocol No. M9101. BASF Report No. M9102. BASF Registration Document No. 91/5003. Unpublished study performed and submitted by BASF Corporation, Research Triangle Park, NC.

DIRECT REVIEW TIME = 8

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CONCLUSIONS:

Degradation - Photodegradation in Water

1. EFGWB concludes that the study provides information that shows the addition of H₂O₂ to aqueous solutions of quinclorac can accelerate the photodegradation of the chemical as compared to degradation in pure water.
2. However, insufficient information was provided in the submitted study to accurately assess the scientific validity of the experiment:
 1. Degradates were not identified or quantified.

2. Data were not expressed in units that would allow a material balance to be determined.
3. The half-lives of quinclorac in solutions containing H₂O₂, was estimated to be between 24 and 65 hours.

In the original study (EFGWB Study 2, MRID 41063560) using sterilized water buffered at pH 7, and irradiated with a xenon lamp, little quinclorac degraded after 29 days. Conversely, two other studies (EFGWB Studies 3 and 4, MRIDs 41063564-A & -B) showed fairly rapid degradation with half-lives of 5 and 10 days, respectively, in unsterilized nonbuffered rice paddy and river waters, and water containing activated sludge when exposed to natural sunlight.

METHODOLOGY:

Two water samples, commercial HPLC-grade water (pH 7.06) and natural pond water (pH 6.73, filtered through a 0.2 micron filter to remove solids and microbes), were placed in serum bottles (composition not specified) and treated at 1.0 ppm with ring-labeled [¹⁴C]quinclorac (radiochemical purity >99%, specific activity 89,726 dpm/mg, BASF) dissolved in methanol.

A portion of the bottles were also treated with hydrogen peroxide at 0, 6.3, 31.6 and 79 mM, and all bottles were sealed with a septum. Half of the samples (photosensitized and non-photosensitized) were continuously irradiated at approximately 37° C using a xenon lamp (Hanau Suntest; intensity 1900 uE/second); wavelengths <290 nm were filtered out (method not reported). The remaining solutions were incubated in the dark (conditions not specified) as controls.

Aliquots of the test solutions were removed through the septa for LSC and TLC analyses at 24, 44, 65 and 132 hours posttreatment. The sample solutions were analyzed by TLC on silica plates developed in acetate:methanol:acetic acid (85:15:5, v:v:v). Additional aliquots from the 132-hour sampling were analyzed using reverse-phase TLC on Whatman LKC18 plates developed in sodium acetate:acetonitrile:acetic acid (75:25:5, v:v).

After the final sampling, the gases in the headspace of the vials were removed with a syringe. Half of the gases were bubbled through a carbon dioxide-trapping scintillation cocktail, the remainder were analyzed by GC with radioactivity detection. Additionally, "some" gas samples were analyzed by GC/MS.

DATA SUMMARY:

The half-lives calculated for quinclorac in water containing 31.6 or 79 mM hydrogen peroxide were <24 hours, regardless of whether HPLC-grade or pond water was used, and the half-lives for water with 6.3 mM hydrogen peroxide "may be as short as 44 hours" (Table 1 and Figure 16).

In water that did not contain hydrogen peroxide, >90% of the quinclorac remained undegraded after 132 hours of irradiation (Figure 16). The study author stated that quinclorac degraded more rapidly in photosensitized and non-photosensitized pond water than in similar sterile water; however, insufficient data points were provided to accurately assess the validity of this conclusion.

Degradates in the solutions were not identified or quantified (although they were isolated using TLC and HPLC). The major volatile degradate of quinclorac was reported to be carbon dioxide (75-95% of the volatile material), and there was one minor volatile degradate, possibly carbon monoxide. The concentration of total [¹⁴C]residues in the solutions and the material balances decreased during the experiment.

REVIEWERS COMMENTS:

1. It is clear from the data that the photodegradation half-life of quinclorac in water photosensitized with hydrogen peroxide solutions is <65 hours and that degradation in nonsensitized water is extremely slow.
2. However, insufficient information was provided in the submitted document to accurately assess the validity of the experiment, since degradates were not identified or quantified, and data were not expressed in units that would allow a material balance to be determined.
3. This document, concerned with the photodegradation of quinclorac in water containing hydrogen peroxide, was submitted by the registrant to supplement "Photolysis of BAS 514 H in pH 7 aqueous solution at 25° C" (MRID 41063560), which was previously reviewed in a report dated May 11, 1990.
4. The original study, conducted in a sterile buffer solution, was conducted according to EPA guidelines; however, the registrant did not believe that the data in that study accurately reflected the rate at which quinclorac would photodegrade under actual use conditions because there is a significant difference between the photolytic half-lives of quinclorac in laboratory solutions (100-135 days in nonsensitized aqueous solutions, 43-52 days in sensitized solutions) and natural waters (approximately 5 days, determined in ancillary studies).
5. The study author stated that hydrogen peroxide was used in this study as a sensitizer because it is "found ubiquitously in natural waters". (EFGWB notes that while this may be a correct assumption, the concentrations found would undoubtedly be much lower than those used in this study. This might result in a much slower photolysis rate than determined in the study.)