DATA EVALUATION RECORD

STUDY 2

CHEM 109101 Mepiquat chloride 161-2

FORMULATION--00--ACTIVE INGREDIENT

STUDY ID 41488112
Funk, H. 1990. Unsensitized and sensitized photolysis of mepiquat chloride in water at pH 7. Registration Document No. BASF 90/0071. Unpublished study performed by BASF, Limburgerhof, FRG, and submitted by BASF Corporation, Research Triangle Park, NC.

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CONCLUSIONS:

Degradation - Photodegradation in Water

1. This study can be used to fulfill data requirements.

2. Mepiquat chloride was stable to photolysis in nonsensitized and sensitized buffer (pH 7) solutions which were irradiated with artificial light (xenon arc lamp) for 23/24 days.

3. This study is acceptable and fulfills EPA Data Requirements for Registering Pesticides by providing information on the photolysis of mepiquat chloride in a sterile buffered (pH 7) aqueous solution.

4. No additional information is needed at this time on the photodegradation of mepiquat chloride in water.

METHODOLOGY:

Ring-labeled [^{14}C]mepiquat chloride (labeled in the 2,6 positions; radiochemical purity >98%, specific activity 1.804 mCi/mMol, BASF), dissolved in methanol, was added at 20 mg/L to a nonsensitized sterile aqueous pH 7 [tris(hydroxymethyl)aminomethane] buffer solution and at 10 mg/L to a sensitized sterile aqueous pH 7 (phosphate) buffer solution containing 0.5% acetone by volume. Portions of each solution were transferred into water-cooled irradiation vessels (Figure 1), which were covered with quartz lids and incubated at 25 ± 1 C. The solutions were stirred with a magnetic bar throughout the study, and were irradiated with artificial light (Suntest Hanau xenon arc lamp; Attachments 10-11) on a 12-hour photoperiod with intermittent 24-hour periods of darkness (nonsensitized only; Table I). Wavelengths <290 nm were filtered out. To collect volatiles, humidified air was passed sequentially through the irradiation vessel and a series of traps containing ethylene glycol, 0.5 M H_2SO_4, and scintillation cocktail (Figure 2). Dark controls, prepared for each solution as described, were incubated on a laboratory shaker in darkness at 25 ± 1 C. The irradiated solutions were sampled after 0, 2, 4, 5, 9, 10 15, 18, 19, 23/24 days posttreatment; the dark controls were sampled only at 23/24 days. At each sampling interval, trapping solutions were removed and replaced with fresh solution.

Aliquots of each sample were analyzed for total radioactivity using LSC. The pH of the sensitized solutions (days 9, 15, 18 and 24 only) was then increased to pH 7 using 0.01 N NaOH. Aliquots of each solution were extracted 1-3 times with dipicrylamine solution in methylene chloride (DCM). Respective extracts were combined, and aliquots of the DCM extracts and the extracted buffer solution phases were analyzed for total radioactivity using LSC. The DCM extracts were evaporated to dryness and redissolved in acetone; the solutions were transferred to glass vials and stored under refrigeration overnight. Aliquots of the DCM extracts were analyzed using one-dimensional TLC on silica gel plates developed with methanol:acetone:HCl (90:10:4, v:v:v). Nonlabeled standards were cochromatographed with the test solution and were visualized by coloring with Dragendorff reagent; radiolabeled compounds were located by radioactive scanning. Aliquots of the DCM extracts were also analyzed by HPLC using an ion substitution column (Zorbax SCX) with a mobile phase of 0.2% triethyammoniumphosphate in distilled water and UV and radioactivity detection. A radiolabeled standard was cochromatographed along with the test solution.

Trapping solutions were analyzed for total radioactivity by LSC.

DATA SUMMARY:

Ring-labeled [^{14}C]mepiquat chloride (labeled in the 2,6 positions; radiochemical purity >98%), at 20 and 10 mg/kg, did not degrade in nonsensitized and sensitized (0.5% acetone) sterile aqueous pH 7 buffer solutions that were irradiated with artificial light (xenon arc lamp) for 23-24 days at 25 C. Mepiquat chloride was the only compound detected in the irradiated and dark control solutions at all sampling intervals (Attachment 8). No volatiles were detected. During the study, material balances were 95.8-105.3% of the nominal application (Tables II and III).

COMMENTS:

1. The study author stated that the pH of the sensitized samples fell to 4.3 during the study. An explanation was given that the drop in pH was due to the "photolytic formation of formic and/or acetic acid."

   Although the decrease in pH should not have affected the behavior of mepiquat chloride, the concentration of radioactivity which was aqueous-soluble in the sensitized solution increased during the study. The study author stated that this was probably due to the decrease in pH in those solutions; analysis of the aqueous-soluble fraction detected only mepiquat chloride.

2. The study author stated that after 4, 9, and 18 days of irradiation, the nonsensitized solution was kept in darkness for 1 day (each); no explanation was provided.

3. No tabular data were submitted confirming the stability of mepiquat chloride during irradiation. The study author provided only the HPLC and TLC chromatograms.

4. The study author stated that the intensity of the light (80,000 lux) reaching the samples was comparable to "midday summer sunshine conditions in FRG."

5. The Dragendorff reagent was composed of solutions of bismuth(III) nitrate (basic) in aqueous acetic acid plus potassium iodide in water.

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