DATA EVALUATION RECORD

DRAFT

CHEM 080808 Propazine §161-2

FORMULATION--00--ACTIVE INGREDIENT

STUDY ID 441848-05
Mobley, G.S. 1994. Solution Photolysis of [^{14}C]Propazine in Artificial Light. Laboratory Project Identification: PTRL Project No.:851. Unpublished study performed by PTRL East, Inc., Richmond, KY, and submitted by Griffin Corporation, Valdosta, GA

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A. CONCLUSIONS:

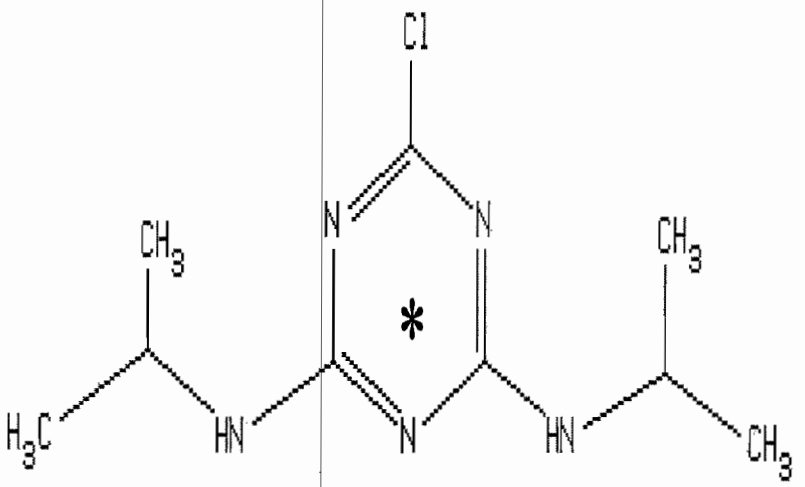
1. The study was submitted to support registration of an end use product and to provide data that may be used toward fulfillment of Subdivision N (161-2) environmental fate requirements on photodegradation of propazine in water under artificial light. The study was found to be generally acceptable, but conducting similar photolysis experiments in the future may be improved by taking into account some technical deficiencies presented in the reviewer's comment and discussion section.

2. Radiolabeled propazine in aqueous buffered solution at pH 7 (pH of hydrolytic stability) did not undergo photolysis after continuous exposure (24 hrs/day) for 15 days to artificial light from xenon arc lamps. The degradation half-life in dark controls was estimated to be 554 days. The degradation half-life of the irradiated samples could not be calculated

because the slope (-k) is almost zero (≥0) in the linear regression analysis of photolysis data (Table IX, page 40). The results indicate that photolysis would not be expected to play a significant role in the overall degradation of propazine in aqueous environments.

B. TEST MATERIAL:

The chemical structure of radiolabeled propazine used in the photolysis test is shown below:



* Denotes site of radiolabel

It has radiopurity of 98.2 % and specific activity of 104.4 uCi/mg. The solubility of propazine was reported to be 8.6 mg/L at 20^0C.

C. TEST METHODOLOGY:

Photolysis: Radiolabeled propazine (4.5 ppm) with 1% acetonitrile co-solvent in sterile pH 7 phosphate buffer was asceptically transferred into quartz tubes and subsequently used as irradiated solutions. Dark control solutions, without the test chemical, were dispensed into Pyrex tubes that were covered by aluminum foil. The quartz tubes were immersed in a deionized water bath for continuous exposure (24hrs/day) of the test samples to xenon arc light over a 15-day period. The dark control tubes were similarly immersed in the same water bath outside the irradiation chamber. The tubes were oriented

at a 30^0 angle with respect to the horizontal. For each test system, two tubes are connected in series with traps consisting of one polyurethane foam plug and two foil-covered, gas dispersion tubes. One dispersion tube contained ethylene glycol and the other had 10% sodium hydroxide, for trapping volatile compounds and CO_2, respectively. The water bath temperature was maintained at 25.13^0C and ranged from 24.80 to 25.27^0C during the exposure period. The intensity of the arc lamps (filtered with a <290-nm cut off sleeve) was monitored continuously at 10-minute intervals at 10-nm increment from 250 to 800 nm with the aid of a datalogger device. At the beginning and end of the study, the spectral intensity of the xenon arc light was determined and compared with spectral distribution of natural sunlight collected on May 11, 1994.

Sampling: Immediately after dosing, two tubes were analyzed at day 0. Then duplicate sample tubes were taken from the irradiated and control sets after 3, 7, 10 and 15 days of continuous (24 hrs/day) light exposure. Aliquots of the test solutions were also taken at the different sampling intervals for pH measurements. On day 0 and day 15, aliquots were removed from each tube to confirm the sterility of the test solution.

Analysis: After collection, all samples were immediately analyzed. Thus, no storage stability analysis was conducted. All radioassays were performed using liquid scintillation spectrometer, with detection limits set at twice background. Quantitative determination of [^{14}C]propazine and its degradates by reverse phase high performance liquid chromatography (HPLC) was done by injecting radiolabeled propazine fortified with a nonradiolabeled reference standard mixture of propazine, 2-hydroxy propazine, atrazine-desethyl, atrazine-desethyl-2-hydroxy, and atrazine-desethyl-deisopropyl. Two-dimensional thin layer chromatography was used to confirm the presence of propazine and its degradates in day 15. Radiolabeled compounds were detected using an imaging scanner and all zones in the plate were scraped and subsequently quantitated by liquid scintillation counter.

D. REPORTED RESULTS:

The material balance throughout the study period was determined at the different sampling intervals (days 0, 3, 7, 10, and 15). The mean total radiocarbon recoveries (± standard deviation) for the irradiated and dark control samples were 96.2±3.2% and 97.3±9.0%, respectively. No more than 0.2% of the applied radiocarbon accumulated in the volatile traps indicating the absence of volatile degradation products and CO_2. The pH of all the samples remained relatively constant and ranged from 6.93 to 7.61.. The photolytic half-life of propazine in dark-control samples was estimated to be 554 days. Linear regression analysis for the first-order kinetics of the irradiated samples yielded a slope≥0, such that half-life could not be calculated. Thus, photolysis would not contribute significantly to propazine degradation in aqueous environments.

E. REVIEWER'S COMMENTS AND DISCUSSION:

1. A close inspection of the emission spectra of the xenon arc lamp in figure 3 on page 44 suggest that light intensity decreased with time. The light intensity values (watts/cm^2) at different wavelengths for the xenon arc spectra taken on July 7, 1994 were slightly lower than those taken on July 28, 1994 at the end of the study period. A comparison of these two spectra with the natural sunlight spectra depicted in figure 4 on page 45 indicate that the xenon arc light intensity was much lower that the solar intensity taken on May 5, 1994. It would have been better if the xenon lamp spectra was compared also with natural sunlight spectra measured in a typical use area during the use season.

2. The test system consisting of two irradiated test tubes connected in series as depicted in figure 2 on page 43 (Apparatus for Aqueous Photolysis) does not appear to be a good setup, especially if photodegradation of a test material takes place. Air coming to the first tube is also passing to the second tube. As such, any volatile or gaseous degradation products formed in the first tube can potentially affect the solution in the second test tube. When this happens, the irradiated solutions in the two test tubes would no longer be considered duplicates.

3. Despite the comments raised in items 1 and 2, the results of the current study are comparable and similar to those obtained by Pape and Zabik (1970) who conducted investigations on the photochemistry of s-triazine herbicides. These investigators reported that propazine did not undergo photolysis when irradiated with artificial light (λ>300 nm). However, aqueous solution of propazine was observed to be converted to 2-hydroxypropazine by UV light (λ=253.7 nm). The current study was done using a xenon arc light with an emission spectra from 290 to 800 nm (similar to that of natural sunlight) where propazine would be expected to be photolytically stable. Consequently, even if the artificial light intensity that was used in the current study was comparable to that of natural sunlight, photodegradation would not be expected.

Reference

Pape, B.E. and Zabik, M.J. 1970. Photochemistry of Bioactive Compounds: Photochemistry of Selected 2-Chloro and 2- Methylthio-4,6-di(alkylamino)-s- Triazine Herbicides. J. Agric. Food Chem. 18(2): 202-207.

STUDY AUTHOR'S CONCLUSIONS INCLUDING PERTINENT TABLES AND FIGURES

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