DATA EVALUATION RECORD UPDATED

DER 2

SHAUGHNESSY No. 041402
COMMON NAME: Molinate
CHEMICAL NAME: S-Ethyl hexahydro-1H-azepine-1-carbothioate
FORMULATION: Not formulated, 99.5% pure active ingredient, ring-2-^{14}C-labeled.
DATA REQUIREMENT: Photodegradation on soil (162-3)

MRID No: 42396501
Werner, R.H, and Theodore M. 1989. Photolysis of Molinate on Soil. Project No. 5915-2/ ICI ENV-007. Unpublished study performed and submitted by ICI Americas, Inc., Wilmington, DE.

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CONCLUSIONS:

1. This study is scientifically valid.

2. Radiolabeled molinate did not degrade significantly in a Biggs clay soil under dark or irradiated (72.6 hours of continuous xenon arc) conditions at 25°C. More than 96% of the recovered radioactivity was extractable from the soil; up to 3% was bound to the soil, and trace amounts of radioactivity were found in the sorbent traps and rinsates of the reactors. In the irradiated samples, molinate comprised 96-99% of the extractable radioactivity at all sampling intervals; one unidentified degradate was present at up 3.8% of the total radioactivity and no other degradates were detected.

3. This study is acceptable and fulfills EPA Data Requirements for Registering Pesticides by providing information on the photodegradation on soil for molinate.

METHODOLOGY:

^{14}C-molinate (radiochemical purity 99.5%, specific activity 27.31 mCi/mmole) at a concentration of approximately 3370 mg/L was applied to 0.4-mm films (Figures 1a and 1b) of Biggs clay (22.8% sand, 27.2% silt, 50.0% clay, 1.7% organic matter, pH 5.5, CEC 29.1 meq/100g) were constantly irradiated with a xenon arc lamp filtered to eliminate wavelengths less than 290 nm at a constant intensity and wavelength comparable to that of natural sunlight. A dark control sample

wrapped in aluminum foil was incubated at 25 ± 1 °C; irradiated and dark control samples were studied in pairs (Figure 2). Soil moisture was maintained at 75% field moisture capacity at 1/3 bar and soil temperature was maintained at 25 ± 1 °C. Humidified air was drawn over each of the samples at approximately 0.7 mL/hour (approximately 2 exchanges of the air in the headspace per hour), with volatiles trapped on XAD-2 resin. The samples intervals were: 0, 18.2, 19.1, 39.2, 40.8, 57.4, 58.3, 72.3, and 72.6 hours after treatment.

At each sampling interval, duplicate soil samples were extracted with a small volume (2.7 mL of acetonitrile:water [12.5:1, v:v]). These extracts were analyzed for total radioactivity by LSC and for the quantity of molinate, molinate sulfoxide, molinate sulfone, and hexahydro-1H-azepine by HPLC (Spherisorb S5 ODS-II column with UV and radioactivity detection). The HPLC detection limit was not reported. The soil photolysis chamber was washed with toluene which, along with the solution from the volatile traps was analyzed by LSC and HPLC. Unextracted radioactivity in the soil was determined by LSC following combustion.

DATA SUMMARY:

Ring-2-^{14}C-molinate applied to 6 cm^2 of soil, which corresponds to the maximum labeled field application rate of 5 lb a.i/acre, did not photodegrade significantly in clay soil that was irradiated continuously (xenon lamp) at 25±1°C and 75% of the FMC at 1/3 bar for up to 72.6 hours. More than 96% of the recovered radioactivity was extractable from the soil; up to 3% was bound to the soil, and trace amounts of radioactivity were found in the sorbent traps and rinsates of the reactors (Tables I, II). In the irradiated samples, molinate comprised 96-99% of the extractable radioactivity at all sampling intervals; one unidentified degradate was present at up 3.8% of the total radioactivity and no other degradates were detected. The average recovery of the radioactivity over an irradiation time equivalent of 30 days of outdoor exposure was 97±2% in the light and 98±3% in the dark.

COMMENTS:

1. Volatilization of molinate was not observed under the conditions of this study; only trace amounts of volatiles were recovered from the walls of the test vessel and the volatile traps. However, in this study, molinate was applied to dry soil, with an airflow through the headspace of the samples of only 0.7 mL/hour.

2. The light/dark photoperiod in this study did not approximate natural conditions; soil was irradiated continuously. In addition, the xenon lamp used emitted light of a higher intensity than that of natural sunlight over all wavelengths (Figure 3). The study authors stated that the intensity of the lamp was approximately 10 times the average of a 24-hour day, and so converted the lamp exposure hours to equivalent outdoor exposure days (72.6 hours converts to 30.25 days). However, since molinate did not photodegrade under conditions more severe than would be encountered in the field, this deviation from the guidelines does not adversely affect the outcome of the study.

3. The study authors estimated the molinate photolysis half-life to be about 7 years. However, this estimation is of limited value because of extrapolation considerably beyond the experimental time limits of the study.

4. The soil was sieved to <0.246 mm before use. This would have essentially removed the sand fraction. However, since molinate did not photodegrade under these conditions, this deviation from the guidelines does not adversely affect the outcome of the study.