

DATA EVALUATION RECORD

I. Study Type: Laboratory Volatility

II. Citation:

Spare, William C. 1994. The Volatilization of Dazomet from Soil. Performed by Agrisearch Incorporated, Frederick, MD. Submitted by BASF Corporation, Research Triangle Park, NC. MRID 42569202.

III. Reviewer:

Name: James A. Hetrick, Ph.D.
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Organization: EFGWB/EFED/OPP

James A. Hetrick

- 5 FEB 1996

IV. Approved by:

Name: Paul J. Mastradone, Ph.D.
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- 5 FEB 1996

V. Conclusions:

The study provides acceptable data on the volatilization of dazomet and its major transformation product methyl isothiocyanate (MITC). No additional volatilization data are needed at this time.

Radiolabelled dazomet, formulated as Basamid Granular and applied at equivalent rate of 500 lbs a.i./A, did not volatilize from soil. The major transformation product and active ingredient of dazomet, MITC, was volatile from soil. The maximum concentration and volatility rate of MITC ranged 1.02×10^5 to 2.8×10^5 $\mu\text{g}/\text{m}^3$ and 16.9 to 24.9 $\mu\text{g}/\text{cm}^2/\text{hr}$ at 50% FC or 75% FC and 100 or 300 ml/minute air flow, respectively.

The reported data indicate the dissipation of dazomet was dependent on degradation (e.g., hydrolysis) to form MITC. The dissipation of MITC was dependent on volatilization from soil surfaces.

VI. Materials and Methods:

Test soil was obtained from a field site in Lucana, N.C. The test soil is classified as a Norfolk soil series (fine-loamy, siliceous, thermic Typic Kandiodults). Physicochemical properties of the test soil are shown in Page 13. The test soil was sieved through a 2 mm sieve and then stored at 50% FC and 25°C.



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A subsample of test soil (50 g) was placed into each of four 500 ml Erlenmeyer flasks. Each flask was wrapped with aluminum foil to prevent photodegradation. Each soil sample was amended with isotopically-diluted radiolabelled dazomet (SA=2.549 $\mu\text{Ci}/\text{mg}$; radiopurity >99%) to approximate an application rate of 500 kg a.i./A. The application rate was adjusted for 10 cm depth incorporation over a 78.54 cm^2 area of soil. The moisture content of two soil samples was adjusted to 50% of field capacity (1/3 bar) and 75% field capacity (1/3 bar). The soil samples were maintained at 25°C using a water bath. A flask representing each moisture regime was continuously purged at 100 and 300 ml/min with CO_2 -free, humidified air (Figure 2). Purged volatile residues were trapped in sequential gas traps of chilled ethyl acetate and KOH. Gas traps were sampled at 1, 2, 3, 4, 6, 8, and 23 hours posttreatment. Soil samples were taken at 23 hours posttreatment.

Analytical

Soil samples were sequentially extracted with ethyl acetate and methanol. Extracts of each soil sample were combined for chemical analysis.

Soluble residues in ethyl acetate gas trap samples were separated using HPLC equipped with a Zorbex ODS column (50 x 0.46 cm) using an acetonitrile/water (50:50 v:v) solvent system. Separated residues were detected using UV/VIS (284 nm) and radioactivity detectors. Soluble residues were also separated by 1-D TLC using a chloroform/methanol 75:25 (v:v) solvent system. Separated residues were identified by co-chromatography with known standards. The total ^{14}C content in gas trap and soil samples was determined by combustion-LSC. The analytical detection limit was 0.011 ppm for the KOH gas trap, 0.057 ppm for ethyl acetate gas trap, and 0.032 ppm for soils.

VII. Study Author's Conclusions

- A. The material balance in preliminary volatility studies accounted for 92.6 to 99.9% of applied radiolabelled dazomet (Table II).
- B. The material balance in the definitive study ranged from 96 to 106% of applied radiolabelled dazomet (Table VI). Radiolabelled residues were predominately detected in ethyl acetate gas traps (51 to 87% of applied) and soil extractable fractions (16 to 45% of applied).
- C. Radiolabelled residue in ethyl acetate gas traps was identified as MITC (Figure 8). The extractable radiolabelled residue in soil was identified as dazomet (Table VII and Figure 7). Radioactive residues in KOH gas traps were predominately identified as CO_2 (Table VIII).

D. The maximum concentration and volatility rate of MITC was $2.1 \times 10^5 \mu\text{g}/\text{m}^3$ and $16.9 \mu\text{g}/\text{cm}^2/\text{hr}$, respectively, at 50% FC and 100 ml/minute air flow; $1.02 \times 10^5 \mu\text{g}/\text{m}^3$ and $23.5 \mu\text{g}/\text{cm}^2/\text{hr}$ at 50% FC and 300 ml/minute air flow; $2.8 \times 10^5 \mu\text{g}/\text{m}^3$ and $22 \mu\text{g}/\text{cm}^2/\text{hr}$ at 75% FC and 100 ml/minute air flow; and $1.09 \times 10^5 \mu\text{g}/\text{m}^3$ and $24.9 \mu\text{g}/\text{cm}^2/\text{hr}$ at 75% of FC and 300 ml/minute air flow (Tables IX to XII).

VIII. Reviewer's Comments

A. The registrant did not provide a complete time series analysis of a material balance and identity of volatile residues in chilled ethyl acetate gas traps. EFGWB believes that repeating the study should not yield additional information because the material balance at the last sampling period (23 hours) was acceptable and a single compound, MITC, was detected in ethyl acetate gas traps. The reported data indicate the dissipation of dazomet was dependent on degradation (e.g., hydrolysis) to form a highly volatile transformation product and active ingredient MITC. The dissipation of MITC was dependent on volatilization from soil surfaces.

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