Aqueous Photolysis of Pymetrozine

Report: Kirkpatrick, D. (1995) (Pyridine-5-(carbon 14)) CGA-215944 the Photolytic Degradation in Water: Lab Project Number: CBG 680: 489-94: CBG/942817. Unpublished study prepared by Huntingdon Life Sciences Ltd. 136 p.

Peters, J. (1997) Photodegradation of (carbon 14)-Triazine-6-CGA-215944 in pH Buffered Solution Under Artificial Light: Lab Project Number: ABR-97038: 262-97. Unpublished study prepared by Novartis Crop Protection, Inc. 127 p.

Parker, S. (1988) Development of a method to investigate the photodegradation of pesticides. Brighton Crop Protection Conference-Pest and Diseases p. 663-668.

Shaw, D. (1997) CGA-215944 (Triazine-6-(Carbon 14)) Rate of Photolytic Degradation in Water: Lab Project Number: CBG 811: 457-96: CBG 811/962086. Unpublished study prepared by Huntingdon Life Sciences Ltd. 118 p.

Document No.: MRIDs 44411321, 44411322, 44471702, 44411323

Guideline: OPPTS 835.2240

Classification: A study classification was not provided on the attached Data Evaluation Record. These studies are now classified as **acceptable**. As an entire package, these studies are scientifically valid and provide useful information on the photodegradation of pymetrozine (pyridine and triazine labels) at pH 7.

PC Code: 101103

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DATA EVALUATION RECORD

STUDY 2

CHEM 101103 Pymetrozine §161-2
CAS No. 123312-89-0
FORMULATION--00--ACTIVE INGREDIENT

STUDY ID 44411321
Kirkpatrick, D. 1995. [Pyridine-5-^{14}C]CGA-215944: The photolytic degradation in water. Laboratory Project ID: CBG 680; Study No.: 489-94. Unpublished study performed by Huntingdon Life Sciences, Ltd., Cambridgeshire, ENGLAND; and submitted by Ciba-Geigy Limited, Basel, SWITZERLAND.

STUDY ID 44411322
Peters, J. 1997. Photodegradation of ^{14}C-Triazine-6-CGA-215944 in pH buffered solution under artificial light. Laboratory Project ID: ABR-97038; Novartis Study No.: 262-97. Unpublished study performed and submitted by Novartis Crop Protection, Inc., Greensboro, NC.

STUDY ID 44471702
Shaw, D. 1997. [Triazine-6-^{14}C] CGA-215944: Rate of photolytic degradation in water. Laboratory Project ID: CBG 811; Novartis Study No.: 457-96. Unpublished study performed by Huntingdon Life Sciences, Ltd., Cambridgeshire, ENGLAND; and submitted by Novartis International, Inc., Basel, SWITZERLAND.

STUDY ID 44411323
Parker, S. 1988. Development of a method to investigate the photodegradation of pesticides. Unpublished study submitted by Novartis Crop Protection, Inc., Greensboro, NC.

DIRECT REVIEW TIME = 79 hours

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CONCLUSIONS

Degradation - Photodegradation in Water

1. This study is scientifically valid and provides useful information on the photodegradation of pymetrozine (pyridine and triazine labels) in pH 7 aqueous buffer solution.

2. This study does meet Subdivision N Guidelines for the fulfillment of EPA data requirements on photodegradation in water. MRID 44471702 in conjuction with MRID 44411322 provides sufficient information on the identification of the major degradates.

3. Pyridine ring-labeled [5-^{14}C]pymetrozine (MRID 44411321)

Pyridine ring-labeled [5-^{14}C]pymetrozine, at a nominal concentration of 10 mg/L, degraded with a registrant-calculated DT_{50} of 4.3 sunlight equivalent days in sterile pH 7 phosphate buffer solution which was irradiated with a xenon arc lamp for 12 hours daily for 30 days and incubated at 24.5 ± 0.7 °C. In contrast, the parent compound was stable in the dark control solution. All data, reported as percentages of the applied radioactivity, are percentages of the nominal application. The reviewer-calculated half-lives for the irradiated and dark control solutions were 2.5 days (r^2 = 0.99) and 371 days (r^2 = 0.77), respectively. Based on HPLC analysis, in the irradiated solutions the parent compound was initially present at 94.8% of the applied radioactivity, decreased to 59.1% of the applied by 2 days posttreatment and was 0.7% of the applied at 30 days. In the dark controls, the parent compound was 90.1% of the applied radioactivity at 30 days posttreatment. The major degradate CGA 300407 was a maximum of 91.8% of the applied at 30 days. The minor degradate CGA 180777 was at a maximum of 4.2% of the applied radioactivity at 30 days posttreatment.

Triazine ring-labeled [6-^{14}C]pymetrozine (MRID 44411322)

Triazine ring-labeled [6-^{14}C]pymetrozine, at a nominal concentration of 11.2 ppm, degraded with a registrant-calculated half-life of 1.9 days (r^2 = 0.98) in sterile pH 7 buffer solution which was irradiated for 12 hours daily with a xenon arc lamp and incubated at 25.0 ± 1°C. In contrast, the parent compound was stable in the dark control solution. All data, reported as percentages of the applied radioactivity, are percentages of the nominal application. The reviewer-calculated half-lives for the irradiated and dark control solutions were 2.0 days (r^2 = 0.93) and 340 days (r^2 = 0.53), respectively. Based on HPLC analysis, in the irradiated solutions the parent compound was initially present at 100.6% of the applied radioactivity, decreased to 47.0% of the applied by 36 hours posttreatment and was 0.3% of the applied at 30 days. In the dark controls, the parent compound was 94.8% of the applied at 30 days. The major degradate CGA-215525 was a maximum of 78.8% of the applied at 14 days and was 54.4% of the applied at 30 days. The major degradate CGA-249257 was a maximum of 26.5% of the applied at 30 days. An unidentified major degradate, tentatively identified as hydroxy CGA-215525, was a maximum of 10.2% of the applied at 30 days.

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Triazine ring-labeled [6-^{14}C]pymetrozine (MRID 44471702)

Triazine ring-labeled [6-^{14}C]pymetrozine, at a nominal concentration of 10 mg/L, degraded with a registrant-calculated half-life of 6.2 sunlight equivalent days at 40° N (r^2 = 0.82) in aqueous pH 7 buffer solution which was irradiated continuously with a xenon arc lamp and maintained at 25 ± 1°C. The parent compound was stable in the dark control solution. All data, reported as percentages of the applied radioactivity, are percentages of the nominal application. Based on HPLC analysis, in the irradiated test samples the parent compound was initially present at 97.9% of the applied radioactivity, decreased to 35.6% of the applied by 1 day posttreatment, and was 0.95% of the applied at 15 days. In the dark controls, the parent was 94.6% of the applied radioactivity at 15 days posttreatment. The major degradate CGA 215525 was a maximum of 45.8% of the applied radioactivity at 1 day posttreatment and was 23.3% of the applied at 15 days. The major degradate CGA 249257 was a maximum of 38.8% of the applied at 15 days. An unidentified major degradate was first detected at 1.8% of the applied radioactivity at 1 day posttreatment and was a maximum of 23.4% of the applied at 15 days; further analysis by TLC indicated that the radioactivity was composed of only minor degradates. The minor degradate CGA 294849 was present at a maximum of 5.3% of the applied radioactivity at 15 days posttreatment.

METHODOLOGY

Pyridine ring-labeled [5-^{14}C]pymetrozine (MRID 44411321)

Pyridine ring-labeled [5-^{14}C]pymetrozine [6-methyl-4-(pyridin-3-yl-methyleneamino)-4,5-dihydro-1,2,4-triazin-3(2H)-one; radiochemical purity 97.2%, specific activity 57.3 µCi/mg; p. 17], dissolved in methanol, was added at a nominal rate of 10 mg/L to pH 7 (phosphate) aqueous buffer solution (p. 23). Solutions were transferred to autoclaved, borosilicate glass vessels and incubated at 24.5 ± 0.7°C in a water-cooled incubation chamber. Temperatures were monitored using a thermocouple probe connected to a test vessel containing untreated buffer solution (p. 25). Dark control solutions were incubated at approximately 25 °C (p. 24). To trap volatiles, humid air was drawn through the system and flushed through ethyl digol and two 1 M KOH traps (p. 24); the limits of quantitation for analysis of the ethyl digol and two 1 M KOH traps were 0.02% of the applied radioactivity and 0.06% of the applied, respectively (pp. 89, 90). The samples were irradiated with a xenon arc lamp for 30 days on a 12 hours on/12 hours off daily cycle (pp. 21, 24). Test solutions were stirred continuously during the incubation. The spectral distribution and light intensity of the artificial light source were measured through a test vessel lid at each sample position with a spectrophotometer (p. 22). Irradiance over the 290-400 nm ranged from 1730-2082 µW/cm^2 (Table 1, p. 37). Sunlight measurements made in September at latitude 52°N (Cambridgeshire, ENGLAND) were corrected to a summer day at 40°N (p. 32). Comparison graphs of

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artificial and natural light were provided in the study (Figures 8, 9; pp. 60, 61). Duplicate irradiated and dark control samples were removed for analysis at 0, 1, 2, 4, 7, 15, and 30 days posttreatment (p. 25). Samples were stored frozen (-20° C) for up to 7 months prior to qualitative analysis; quantitative analysis occurred on the day of sampling. The pH and sterility of the buffer solution were measured at each sampling interval (p. 26).

Duplicate aliquots of each sample were analyzed for total radioactivity by LSC (p. 26); the limit of quantitation was 0.046% of the applied radioactivity (p. 88). Aliquots of each solution were analyzed by HPLC (Nucleosil 120-5C18 column) with a mobile phase gradient of water:acetonitrile (100:0 to 93:7 to 88:12 to 2:98; v:v); both radioactive flow detection and LSC analysis of the eluent were used (p. 30). The limit of quantitation for HPLC was 0.052% of the applied radioactivity (pp. 90, 91). Samples were co-chromatographed with nonradiolabeled reference standards visualized by UV light (no wavelength reported). To confirm compound identities, the irradiated test samples were analyzed by two-dimensional TLC on silica gel plates developed sequentially with ethyl acetate:methanol:water (12:6:1; v:v:v) and methanol:chloroform:water (12:6:1; v:v:v; p. 28); the limit of quantitation for TLC was 0.41% of the applied radioactivity (pp. 91, 92). Samples were co-chromatographed with nonradiolabeled reference standards which were visualized under UV light (wavelength not reported); radiolabeled residues were located using a Bioimaging analyzer. Compound identities were further confirmed by GC/MS (p. 27).

Triazine ring-labeled [6-^{14}C]pymetrozine (MRID 44411322)

Triazine ring-labeled [6-^{14}C]pymetrozine (radiochemical purity 98.6%, specific activity 41.1 µCi/mg) was added at a nominal application of 11.2 ppm to pH 7 (0.067 M phosphate) aqueous buffer solution (p. 21). Solutions were transferred to autoclaved, borosilicate vessels and incubated at 25 ± 1°C in a water-cooled incubation chamber (p. 25). Temperatures were monitored using a thermocouple probe connected to a test vessel containing untreated buffer solution. To trap volatiles, humid air was drawn through the system and flushed through ethylene glycol and two 10% KOH traps (p. 22); the limits of quantitation for analysis of KOH traps and the ethylene glycol volatile traps were 0.004 ppm and 0.003 ppm, respectively (p. 29). The samples were irradiated with a xenon arc lamp for 30 days on a 12 hours on/12 hours off daily cycle (p. 25). The spectral distribution and light intensity of the artificial light source were measured through a test vessel lid at each sample position with a spectrophotometer. Sunlight measurements were made in September, 1995 at latitude 36°N (Greensboro, NC). Comparison graphs of artificial and natural light were provided in the study (Figure 14, pp. 88-91). Duplicate irradiated samples were removed for analysis at 0, 6, 24, 27, 30, 36 hours; and 2, 3, 7, 14 and 30 days posttreatment (p. 26). Dark controls were sampled at 0, 7, 14, and 30 days posttreatment. Samples were stored frozen (<-10° C) for no more than 23 days prior to qualitative analysis; quantitative analysis occurred on the day of sampling (pp. 27-28). The pH and sterility of the buffer solution was measured at each sampling interval (pp. 23, 27).

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Triplicate aliquots of each sample were analyzed for total radioactivity by LSC (pp. 29-30). Samples were analyzed by reverse-phase HPLC (Alltima C-18 column) with a mobile phase gradient of methanol:0.01 M ammonium acetate buffer (pH 7; 0:100 to 8:92 to 48:52 to 100:0; v:v; p. 32); fractions were collected and analyzed by LSC. Samples were co-chromatographed with nonradiolabeled reference standards visualized by UV light (240 nm). To confirm compound identities, aliquots of each solution were diluted with methanol and analyzed by two-dimensional TLC on silica gel plates developed sequentially with chloroform:methanol:ammonium hydroxide:water (80:30:4:2; v:v:v:v) and ethyl acetate:propanol:water:formic Acid (65:25:12:4; v:v:v:v; 6 hour - 30 day samples) or two-dimensional TLC on aluminum oxide plates developed sequentially with ethyl acetate:methanol:water (75:15:10; v:v:v), chloroform:methanol:ammonium hydroxide:water (80:30:4:2; v:v:v:v; day 0, dark control samples; p. 31). Samples were co-chromatographed with nonradiolabeled reference standards visualized by UV light (wavelength not reported); radiolabeled residues were located using a Bioimaging analyzer. Compound identities were further confirmed by LC/MS and MS/MS in positive ion mode (p. 34; Table VII, p. 51).

Volatile traps were analyzed by LSC at each sampling interval (p. 27).

Triazine ring-labeled [6-^{14}C]pymetrozine (MRID 44471702)

Triazine ring-labeled [6-^{14}C]pymetrozine (radiochemical purity > 97%, specific activity 55.7 µCi/mg; p. 18) was added at a nominal rate of 10 mg/L to pH 7 (phosphate) aqueous buffer solution (p. 22). Solutions were transferred to autoclaved, borosilicate glass vessels and incubated at 25.0 ± 1.0 °C in a water-cooled incubation chamber (p. 23). Temperatures were monitored using a thermocouple probe connected to a test vessel containing untreated buffer solution. Dark control solutions were incubated at 25.4 ± 0.5 °C. To trap volatiles, humid air was drawn through the system and flushed through ethyl glycol and two 1 M KOH traps (p. 23). The samples were irradiated continuously with a xenon arc lamp for up to 15 days (p. 20). Irradiance over the 290-400 nm ranged from 0.22 to 160 µW/cm^2 (Appendix 2, p. 92). The maximum duration of irradiation was equivalent to about 40 days of natural summer sunlight at latitude 40°N. Sunlight measurements were made in October, 1996 at latitude 52°N (Cambridgeshire, ENGLAND). Comparison graphs of artificial and natural light were provided in the study (Table 2 and Figures 6, 7; pp. 39, 59, 60). Duplicate irradiated and dark control samples were removed for analysis at 0, 1, 7, and 15 days posttreatment (p. 24). Samples were stored frozen (< -20 °C) for no more than 7 days. The pH and sterility of the buffer solution was measured at each sampling interval (pp. 25, 26). Tryptone Soya Agar plates were prepared in duplicate to check for microbial growth.
Aliquots of each solution were analyzed for total radioactivity by LSC (p. 26); the limit of quantitation for LSC was 0.0028 ppm (0.027% of the applied radioactivity; p. 98). Triplicate aliquots of each solution were analyzed by HPLC (Zorbax SB-C18 column) with a mobile phase gradient of water:acetonitrile both with 0.05% trifluoroacetic acid (100:0 to

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93:7 to 88:12 to 82:18 to 2:98; v:v; p. 29; the limit of quantitation for HPLC analysis was 0.003 ppm (0.032% of the applied radioactivity; pp. 100, 101). To confirm compound identities, aliquots of each solution were analyzed by two-dimensional TLC developed perpendicularly with ethyl acetate:methanol (1:1; v:v) followed by chloroform:methanol:ammonia solution:water (80:30:4:2; v:v:v:v) at each sampling interval (p. 27); the limit of quantitation for TLC analysis was 0.003 ppm. Samples were cochromatographed with nonradiolabeled reference standards visualized by UV light (wavelength not reported); fractions were collected and analyzed by LSC. To confirm compound identities, mass spectra of the test and reference substances were obtained by MS. LC/MS was used to isolate one of the unknown degradates. GC/MS was also used to analyze an unknown degradate (Unknown 1; p. 26). The unknown degradate was also analyzed by reverse-phase HPLC (Zorbax ODS) with a mobile phase gradient of water:acetonitrile (100:0 to 93:7 to 88:12 to 82:18 to 2:98; v:v; p. 30).

DATA SUMMARY

Pyridine ring-labeled [5-^{14}C]pymetrozine (MRID 44411321)

Pyridine ring-labeled [5-^{14}C]pymetrozine (radiochemical purity 97.2%), at a nominal concentration of 10 mg/L, degraded with a registrant-calculated DT_{50} of 4.3 sunlight equivalent days in sterile pH 7 phosphate buffer solution which was irradiated with a xenon arc lamp for 12 hours daily for 30 days and incubated at 24.5 ± 0.7 °C (Table 9, p. 45). In contrast, the parent compound was stable in the dark control solution. All data, reported as percentages of the applied radioactivity, are percentages of the nominal application. The reviewer-calculated half-lives for the irradiated and dark control solutions were 2.5 days (r^2 = 0.99) and 371 days (r^2 = 0.77), respectively. Based on HPLC analysis, in the irradiated solutions the parent compound was initially present at 94.8% of the applied radioactivity, decreased to 77.3% of the applied by 1 day posttreatment, was 59.1% of the applied at 2 days, and decreased to 0.7% by 30 days (Table 11, p. 47). In the dark controls, the parent compound was present at 90.1% of the applied radioactivity at 30 days (Table 15, p. 51). The major degradate

pyridine-3-carbaldehyde (CGA 300407)

was initially present (0 days) at 2.8% of the applied radioactivity, increased to 19.3% of the applied by 1 day posttreatment, was 66.6% of the applied at 4 days and was a maximum of 91.8% of the applied at 30 days. The minor degradate nicotinic acid (CGA 180777) was a maximum of 4.2% of the applied radioactivity at 30 days posttreatment. Radiolabeled volatiles were negligible throughout the incubation period.

Material balances for the irradiated samples ranged from 92.3 to 99.4% of the applied radioactivity (Table 4, p. 40). For the dark control samples, the material balances were 98.5-100.3% of the applied radioactivity (Table 5, p. 41).

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Triazine ring-labeled [6-^{14}C]pymetrozine (MRID 44411322)

Triazine ring-labeled [6-^{14}C]pymetrozine (radiochemical purity 98.6%), at a nominal concentration of 11.2 ppm, degraded with a registrant-calculated half-life of 1.9 days (r^2 = 0.98; Figure 42, p. 121) in sterile pH 7 buffer solution which was irradiated with a xenon arc lamp for 12 hours daily and incubated at 25.0 ± 1°C (Figure 15, pp. 92-94). In contrast, the parent compound was stable in the dark control solution (Figure 43, p. 122). All data, reported as percentages of the applied radioactivity, are percentages of the nominal application. The reviewer-calculated half-lives for the irradiated and dark control solutions were 2.0 days (r^2 = 0.93) and 340 days (r^2 = 0.53), respectively. Based on HPLC analysis, in the irradiated solution the parent compound was initially present at 100.6% of the applied radioactivity, decreased to 67.3% of the applied by 1 day posttreatment, was 47.0% of the applied at 36 hours posttreatment, and was 0.3% of the applied at 30 days (Table XVI, p. 60). In the dark controls, the parent compound was 94.8% of the applied radioactivity at 30 days posttreatment. The major degradate

4-amino-5-hydroxy-6-methyl-4,5-dihydro-2H-(1,2,4)-triazin-3-one (CGA-215525)

was first detected at 14.3% of the applied radioactivity at 6 hours posttreatment, increased to 41.6% of the applied by 1.25 days and 55.7% of the applied by 3 days, was a maximum of 78.8% of the applied at 14 days, and was 54.4% of the applied at 30 days. The major degradate

6-methyl-4,5-dihydro-2H-(1,2,4)-triazin-3-one (CGA-249257)

was first detected at 1.7% of the applied radioactivity at 3 days posttreatment, increased to 8.3% of the applied by 14 days, and was a maximum of 26.5% of the applied at 30 days. An unidentified major degradate, tentatively identified as hydroxy CGA-215525, was initially present (0 days) at 0.1% of the applied radioactivity, increased to 2.9% of the applied by 14 days posttreatment, and was a maximum of 10.2% of the applied at 30 days (see Comment #1). An unidentified minor degradate was present at a maximum of 3.7% of the applied radioactivity at 27 hours posttreatment. Radiolabeled volatiles were negligible throughout the incubation period.

Material balances for the irradiated samples ranged from 91.7 to 104.0% of the applied radioactivity (Table XII, p. 56). For the dark control samples, the material balances were 95.6-102.2% of the applied radioactivity (Table XIII, p. 57).

Triazine ring-labeled [6-^{14}C]pymetrozine (MRID 44471702)

Triazine ring-labeled [6-^{14}C]pymetrozine (radiochemical purity >97%), at a nominal concentration of 10 mg/L, degraded with a registrant-calculated half-life of 6.2 sunlight-equivalent days at 40° N (r^2 = 0.82) in aqueous pH 7 buffer solution which was irradiated continuously with a xenon arc lamp and maintained at 25.0 ± 1°C (Table 9 and Appendix 3,

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Table 1; pp. 46, 93). In contrast, the parent compound was stable in the dark control solution. All data, reported as percentages of the applied radioactivity, are percentages of the nominal application. Based on HPLC analysis, the parent compound was initially present in the irradiated test samples at 97.9% of the applied radioactivity, decreased to 35.6% of the applied by 1 day posttreatment, and was 0.95% of the applied at 15 days (Table 8, p. 45). In the dark controls, the parent was initially present at 97.9% of the applied radioactivity and was 94.6% of the applied at 15 days posttreatment. The major degradate

CGA 215525

was first detected at a maximum of 45.8% of the applied radioactivity at 1 day posttreatment, decreased to 23.3% of the applied by 15 days (Table 11, p. 48). The major degradate

CGA 249257

was first detected at 5.8% of the applied radioactivity at 1 day posttreatment, increased to 28.9% of the applied by 7 days, and was at a maximum of 38.8% of the applied at 15 days. An unknown major degradate was first detected at 1.8% of the applied radioactivity at 1 day posttreatment, increased to 15.0% of the applied by 7 days, and was 23.4% of the applied at 15 days; further analysis by TLC indicated that the radioactivity was composed of only minor degradates (see Comment #2). Based on TLC analysis, the minor degradate 4-amino-6-methyl-2H-(1,2,4)-triazine-3,5-dione (CGA 294849) was present at a maximum of 5.3% of the applied radioactivity at 15 days posttreatment (see Comment #4). Two additional unidentified degradates were present at ≤4.3% of the applied radioactivity. Radiolabeled volatiles were negligible throughout the incubation period (Table 6, 7; pp. 43, 44).

Material balances for the irradiated samples ranged from 97.0 to 99.7% of the applied radioactivity (Table 4, p. 41). For the dark control samples, the material balances were 98.5-100.7% of the applied radioactivity (Table 5, p. 42).

COMMENTS

1. A major degradate was not identified in the triazine label studies (MRIDs 44411322 and 44471702). In MRID 44411322, the unidentified degradate was a maximum of 10.2% of the applied radioactivity at 30 days posttreatment. The reviewer notes that the unidentified major degradate in MRID 44411322 was tentatively identified as hydroxy CGA-215525 (p. 42, MRID 44411322). In MRID 44471702, the unidentified degradate was a maximum of 23.4% of the applied radioactivity at 15 days posttreatment (see Comment #2). Identification of residues present at levels greater than or equal to 10% of the applied is a critical element of the aqueous photolysis study and is required under Subdivision N Guidelines. Failure to identify (and confirm the identity of) significant

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metabolites limits the understanding of the aqueous photolysis under actual use situations; hence the environmental fate of the pesticide is unclear (Rejection Factor 2, p. 31, Pesticide Reregistration Rejection Rate Analysis Environmental Fate, EPA 738-R-93-010, Sept. 1993).

2. The unidentified major degradate isolated by HPLC in MRID 44471702 was separated into four degradates by 2D-TLC. Based on TLC analysis, the maximum concentration of a single degradate was 7.3% of the applied radioactivity (p. 34; MRID 44471702). Therefore, it is likely that all major degradates for the triazine-label compound were identified when data from both triazine label studies are considered.

3. A phosphate buffer solution was used; it is recommended that borate or acetate buffers be utilized to minimize buffer effects (MRID #'s 44411321, 44411322, and 44471702).

4. The minor degradate CGA 294849 was isolated by 2D-TLC only (MRID 44471702). HPLC analysis was unable to separate CGA 294849 and CGA 215525.

5. The pH of maximum hydrolytic stability was not reported by the study author. The reviewer noted that little degradation was observed in the pH 7 dark control solution.

6. In MRID 44411322, the aqueous buffer solution (phosphate) concentration was 0.067 M (p. 21). It is recommended that buffer solutions be used at the lowest concentration possible, preferably 0.01 M, to preclude possible catalysis effects.

7 The limits of quantitation reported in MRID 44411322 were unclear to the reviewer (p. 29).

8. The aqueous solubility of the parent compound at pH 7 was reported to be 270 mg/l at 20°C.

9. The reviewer noted that the discrepancy between the HPLC data and the TLC data was due to isomerization of CGA 215944 during irradiation. The study author stated that the Z isomer is less thermally stable than the E isomer and subsequent HPLC analysis would cause degradation on the column and give a lower estimate for CGA 215944 than obtained by TLC (p. 35). The observed data initially followed this pattern, but the study author stated that a subsequent test to confirm this phenomenon proved inconclusive (MRID 44471702).

10. The reviewer notes that the registrant-calculated half-life of the parent compound (MRID 44471702) was 6.2 sunlight equivalent days at 40 °N; however, approximately only 3.5% of the applied radioactivity was present at approximately 3 sunlight equivalent days (Table 8, p. 45). Similarly, in MRID 44411321, the reviewer notes that the registrant-calculated half-life for the parent compound was 4.3 sunlight equivalent days; however, 31% of the applied radioactivity was present at approximately 4.8 sunlight equivalent days (Table 8, p. 44).

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11. A method development study was provided for review (MRID 44411323). The reviewer noted that no new information was provided that was necessary for review of the photolysis studies.