

US EPA ARCHIVE DOCUMENT



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
WASHINGTON, D.C. 20460

009198

OFFICE OF  
PESTICIDES AND TOXIC  
SUBSTANCES

Subject: Mancozeb, Qualitative Risk Assessment - 2-Year  
Sprague-Dawley Rat Dietary Study, 1990

Caswell no.913A

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Summary

The qualitative risk assessment of mancozeb was based upon a two year chronic toxicity/oncogenicity dietary study in Sprague-Dawley rats. The animals, of both sexes, were fed 0, 20, 60, 125 and 750 ppm. of mancozeb.

The study allocated 72 males/females to each dose group and selected 10 of them for an interim sacrifice at 12 months.

The statistical evaluation of mortality in the study indicated no significant dose related differences in survival in either sex.

Male rats had a significant dose related increasing trend in thyroid follicular cell adenomas, carcinomas and in the combined thyroid follicular cell adenomas and/or carcinomas. The three tumor rate categories also were significantly increased in the pair-wise comparison of controls and the highest (750 ppm.) dose group.

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The female rats had a significant dose related increasing trend in thyroid follicular cell adenomas, carcinomas and in the combined thyroid follicular cell adenomas and/or carcinomas. The combined thyroid follicular cell adenoma and/or carcinoma tumor rate had a significant increase in the comparison of controls and the highest (750 ppm) dose level. The tumor rates in adenomas and in carcinomas had a borderline significant increase in the pair-wise comparison of controls and the highest (750 ppm.) dose group.

#### Background

A 2-year chronic toxicity/oncogenicity study in Sprague-Dawley rats was conducted by Haskell Laboratory for Toxicology and Industrial Medicine for E.I. du Pont de Nemours and Company (project no.7859-001/report no. 259-89, and MRID no. 41903601) and issued in September, 1990.

The study design assigned in a random manner groups of 72 males/females to dose levels of 0, 20, 60, 125 and 750 ppm. of mancozeb. An interim sacrifice of 10 males/females was made at each dose level of the compound after 12 months.

#### Survival Analysis

In male rats, there was no statistically significant differential mortality among the dose levels of mancozeb (Table 1).

The female rats also did not have any significant dose related mortality in the mancozeb feeding study (Table 2).

The statistical evaluation of mortality in the rat studies was based upon the Thomas, Breslow and Gart computer program.

#### Tumor Analysis

Male rats had a significant increasing dose related trend in thyroid follicular cell adenomas, carcinomas and in the combined thyroid follicular adenomas and/or carcinomas. Also in the pair-wise comparison of controls and the 750 ppm. groups, there was a significant increase in thyroid follicular cell adenomas, carcinomas and in the combined thyroid follicular cell adenomas and/or carcinomas (Table 3) in the mancozeb data.

Female rats had a significant increasing dose related trend in thyroid follicular cell adenomas, carcinomas and in the combined thyroid follicular adenomas and/or carcinomas. The females had a significant increase in the combined thyroid follicular cell adenoma and/or carcinoma rates in the pair-wise comparison with controls and the highest (750 ppm) dose group. In addition they also had a borderline significant increase in adenomas and in carcinomas in the pair-wise comparison of controls and the highest (750 ppm.)

dose of mancozeb (Table 5).

The above statistical analysis of tumor rates was based upon the Cochran-Armitage Trend test and Fisher's Exact test for pair-wise comparisons of controls and each dose group, since neither sex of rats had significant statistical evidence of differential mortality with increasing doses of mancozeb.

#### Hyperplasia Analysis

Both male and female rats had a significant dose related increasing trend in thyroid follicular cell hyperplasia. In addition both sexes had a significant increase in hyperplasia in the pair-wise comparison of controls and the highest (750 ppm.) dose level of mancozeb (Tables 4 and 6).

Thyroid follicular cell hyperplasia rates were also evaluated by the Cochran-Armitage Trend test and Fisher's Exact test for pair-wise comparisons of controls and each dose level because there was no observed significant dose related mortality in either male or female rats.

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Table 1. Mancozeb - Sprague-Dawley Rat Study, Male  
Mortality Rates\* and Cox or Generalized  
K/W Test Results

Dose (ppm)	<u>Weeks</u>					Total
	1-26	27-51	52 <sup>a</sup>	52-78	79-105 <sup>b</sup>	
0	1/72	1/71	10/70	12/60	32/48	46/62(74)
20	0/72	0/72	10/70	11/60	35/51	46/62(74)
60	0/72	1/71	10/71	13/61	24/48	38/62(61)
125	1/72	3/71	10/68	14/58	33/44	51/62(82)
750	0/72	1/72	10/71	13/61	38/47	52/62(84)

\* Number of animals that died during interval/Number of animals alive at the beginning of the interval.

( ) percent

<sup>a</sup> Interim sacrifice at week 52.

<sup>b</sup> Final sacrifice at week 105.

Note: Time intervals were selected for display purposes only.  
Significance of trend denoted at Control.  
Significance of pair-wise comparison with control denoted at Dose level.

If \* then  $p < .05$  and if \*\* then  $p < .01$ .

Table 2. Mancozeb - Sprague-Dawley Rat Study, Female  
Mortality Rates<sup>a</sup> and Cox or Generalized  
K/W Test Results

Dose(ppm)	<u>Weeks</u>				Total
	1-52	53 <sup>a</sup>	53-78	79-105 <sup>b</sup>	
0	0/72	10/72	13/62	27/49	40/62(65)
20	2/72	10/70	8/60	20/52	30/62(48)
60	0/72	10/72	10/62	28/52	38/62(61)
125	1/72	10/71	10/61	27/51	38/62(61)
750	1/72	10/71	9/61	28/52	38/62(61)

<sup>a</sup> Number of animals that died during interval/Number of animals alive at the beginning of the interval.

( ) percent

<sup>a</sup> Interim sacrifice at week 53.

<sup>b</sup> Final sacrifice at week 105.

Note: Time intervals were selected for display purposes only.  
Significance of trend denoted at Control.  
Significance of pair-wise comparison with control denoted  
at Dose level.

If \* then  $p < .05$  and if \*\* then  $p < .01$ .

Table 3. Mancozeb - Sprague-Dawley Male Rats Thyroid Follicular Cell Tumor Rates\* and Cochran-Armitage Trend Test and Fisher's Exact Test Results (p values)

Tumors	<u>Dose (ppm)</u>				
	0	20	60	125	750
Adenomas (%)	0/70 (0)	1/72 (1)	1/71 (1)	0/68 (0)	20 <sup>a</sup> /71 (28)
p=	0.000 <sup>---</sup>	0.507	0.504	1.000	0.000 <sup>---</sup>
Carcinomas (%)	0/70 (0)	1 <sup>b</sup> /72 (1)	2/70 (3)	2/68 (3)	14/71 (20)
p=	0.000 <sup>---</sup>	0.507	0.248	0.241	0.000 <sup>---</sup>
Both (%)	0/70 (0)	2/72 (3)	3/70 (4)	2/68 (3)	34/71 (48)
p=	0.000 <sup>---</sup>	0.255	0.122	0.241	0.000 <sup>---</sup>

\* Number of tumor bearing animals/Number of animals examined, excluding those that died before 52 weeks.

<sup>a</sup> First adenoma observed at week 63, dose 750 ppm.

<sup>b</sup> First carcinoma observed at week 52, dose 20 ppm.

Note: Significance of trend denoted at Control.  
Significance of pair-wise comparison with control denoted at Dose level.

If \* then  $p < .05$  and if <sup>---</sup> then  $p < .01$ .

Table 4. Mancozeb - Sprague-Dawley Male Rats, Thyroid Follicular Cell Hyperplasia Only Rates<sup>-</sup> and Cochran-Armitage Trend Test and Fisher's Exact Test Results (p values)

	<u>Dose (ppm)</u>				
	0	20	60	125	750
Hyperplasia only (%)	1/70 (1)	1/72 (1)	2/71 (3)	3 <sup>*</sup> /68 (4)	25/71 (35)
p=	0.000 <sup>-</sup>	0.745	0.505	0.299	0.000 <sup>-</sup>

<sup>-</sup> Number of animals with hyperplasia/Number of animals examined, excluding those that died before 52 weeks.

<sup>\*</sup> First hyperplasia observed at week 52, dose 125 ppm.

Note: Significance of trend denoted at Control.  
Significance of pair-wise comparison with control denoted at Dose level.

If <sup>\*</sup> then  $p < .05$  and if <sup>-</sup> then  $p < .01$ .



Table 5. Mancozeb - Sprague-Dawley Female Rats, Thyroid Follicular Cell Tumor Rates<sup>a</sup> and Cochran-Armitage Trend Test and Fisher's Exact Test Results (p values)

Tumors	<u>Dose (ppm)</u>				
	0	20	60	125	750
Adenomas (%)	1 <sup>a</sup> /62 (2)	1/60 (2)	1/62 (2)	1/61 (2)	6/60 (10)
p=	0.001 <sup>-</sup>	0.744	0.752	0.748	0.052
Carcinomas (%)	0/62 (0)	0/60 (0)	0/62 (0)	1/61 (2)	4 <sup>b</sup> /60 (7)
p=	0.000 <sup>-</sup>	1.000	1.000	0.496	0.056
Both (%)	1/62 (2)	1/60 (2)	1/62 (2)	2/61 (3)	10/60 (17)
p=	0.000 <sup>-</sup>	0.744	0.752	0.494	0.004 <sup>-</sup>

<sup>a</sup> Number of tumor bearing animals/Number of animals examined, excluding those that died or were sacrificed before 54 weeks.

<sup>b</sup> First adenoma observed at week 83, dose 0.

<sup>c</sup> First carcinoma observed at week 99, dose 750 ppm.

Note: Significance of trend denoted at Control.  
Significance of pair-wise comparison with control denoted at Dose level.

If <sup>-</sup> then  $p < .05$  and if <sup>-</sup> then  $p < .01$ .

Table 6. Mancozeb - Sprague-Dawley Female Rats, Thyroid Follicular Cell Hyperplasia Only Rates\* and Cochran-Armitage Trend Test and Fisher's Exact Test Results (p values)

	<u>Dose (ppm)</u>				
	0	20	60	125	750
Hyperplasia only (*)	1/72 (1)	0/71 (0)	1/72 (1)	0/71 (0)	27 <sup>n</sup> /72 (38)
p=	0.000 <sup>m</sup>	0.504(n)	0.752	0.504(n)	0.000 <sup>m</sup>

\* Number of animals with hyperplasia/Number of animals examined, excluding those that died before observation of the first lesion.

<sup>n</sup> First hyperplasia observed at week 44, dose 750 ppm.

n Negative change from control.

Note: Significance of trend denoted at Control.  
Significance of pair-wise comparison with control denoted at Dose level.

If <sup>m</sup> then  $p < .05$  and if <sup>n</sup> then  $p < .01$ .

References

- Armitage, P. (1955) Tests for Linear Trends in Proportions, Biometrics 11, 375-386.
- Cochran, W.G. (1954) Some Methods for Strengthening the Comon  $X^2$  Test, Biometrics 10, 417-451.
- Cox, D.R. (1972) Regression Models and Life Tables (with disussion) J. Royal Stat. Soc. Ser. B. 34, 187-220.
- Thomas, D.G., Breslow, N., and Gart, J.J. (1977) Trend and Homogeneity Analysis of Proportions and Life Life Table Data, Computers and Biomedical Research 10, 373-381.

U.S. ENVIRONMENTAL PROTECTION AGENCY  
OFFICE OF PESTICIDES/HED/SACB  
TOX ONELINERS

FILE LAST PRINTED: 03/09/90

TOXCHEM NO. 913A-Zinc ion and manganese ethylene bisdithiocarbamate (coordination product of Mn 16%, Zn 2%, ethylene bisdithiocarbamate 62%)

CITATION	MATERIAL	ACCESSION/ NRID NO.	RESULTS	TOX CAT	COREGRADE/ DOCUMENT#
83-1(a) and 83-2(a) Feeding 90 week Species: rat Rohm and Haas 3/4/68	Uthane M-45 86% a.i.		NOEL = 100 ppm LEL = 1000 ppm (thyroid hyperplasia). Doses: 25, 50, 100, 1000 ppm	002493	
83-1(a) and 83-2(a) Feeding/oncogenic-2 year Species: rat Medical College of Virginia 11/9/65	Mancozeb tech. (86% a.i.)	00080713	Doses: 0, 25, 50, 100, 1000 ppm. Systemic NOEL = 100 ppm. Sys. LEL = 1000 ppm (thyroid hyperplasia in both sexes). Poor survival necessitated termin. at 90 weeks; inadequate histopathology & clinical chem; no individual animal data.	002493 Supplementary 005425	
83-1(a) and 83-2(a) Chronic/onco feeding Species: rat Dumont Haskell Lab 7859-001; 259-89; 09/13/90	Mancozeb tech. (83.8%)	419036-01	Doses tested: 0, 20, 60, 125 or 750 ppm. Systemic NOEL = 60 ppm (males = 2.33 mg/kg/d; females = 3.06 mg/kg/d). Sys. LOEL = 125 ppm (4.38/6.72 mg/kg/d) - based on renal pigments. Additionally at the NOI: thyroid hypertrophy, follicular cell carcinoma; bilateral retinopathy and reduced body weight). NOI = 30.9/40.2 mg/kg/d.	Minimum 008638	
83-1(b) Feeding-2 year Species: dog Rohm and Haas 3/4/68	Mancozeb Tech. 86% a.i.	00080714	NOEL > 1000 ppm (NOI). Doses: 25, 100 & 1000 ppm. Lower iodine-131 up-take at 100 and 1000 ppm (values within normal range for dogs)	002493 Supplementary 005425	
83-1(b) Feeding-1 year Species: dog Hazelton Labs, Europe 616/3 (#88RC-027); 07/28/88	Mancozeb tech. 80.6-84.5%	414486-01	Doses tested: 0, 50, 200, 800 and 1600 ppm. NOEL = 50 ppm (1.75 mg/kg/d in males; 1.84 mg/kg/d (F)). LOEL = 200 ppm (7.26 mg/kg/d (M); 7.02 mg/kg/d (F)), based on decreased body weight gain.	Minimum 008451	
83-1(b) Feeding-1 year Species: dog Hazelton Labs, Europe 016/3; Rep 88RC027; 07/28/88	Mancozeb tech. (80.6-84.5% a.i.)	414486-01	Doses tested: 0, 50, 200, 800 and 1600 ppm. NOEL = 50 ppm (M = 1.75 mg/kg/d; (F) = 1.84 mg/kg/d) LOEL = 200 ppm (M) = 7.26 mg/kg/d; (F) = 7.02 mg/kg/d based on decr. body wt. gain.	Minimum 008451	
83-3(a) Developmental Toxicity Study Species: rat Boor, Allen & Hamilton Shell 10065 009; 5/29/80	Mancozeb 83% a.i. Lot # 4268	246663 093929	Teratogenic NOEL = 128 mg/kg; Terate LEL = 512 mg/kg (dilated ventricles spinal cord hemorrhage, delayed/incomplete ossification of skull & ribs). Fetotoxic NOEL = 128 mg/kg; Feto LEL = 512 mg/kg. (increased resorptions depressed pup wt. Mat NOEL = 32 mg/kg; Mat LEL = 128 mg/kg (decr food consumption & wt. Doses: 0, 2, 6, 32, 128 & 512 mg/kg BLU(SD)BR str.	Minimum 002169 Min mm 005425 005425	009498

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TOXLINE# NO. 913A - Zinc Ion and manganese ethylene bisdithiocarbamate (coordination product of Mn 16%, Zn 2%, ethylene bisdithiocarbamate 62%) FILE LAST PRINTED: 03/09/91

CITATION	MATERIAL	ACCESSION/ NRID NO.	RESULTS	TOX CAT	CONGRADE/ DOCUMENT#
83-3(b) Developmental Toxicity Study Species: rat/dlt Strom Biological Lab., Can. 68 RC-1013; 8/8/68	Mancozeb Tech. (80% a.i.)	1M1207	Doses: 0, 25, 250 mg/kg/day. Teratogenic NOEL > 250 mg/kg. Fetotoxic NOEL > 250 mg/kg. Maternal NOEL = 25 mg/kg. Maternal LEL = 250 mg/kg (decreased body weight). A/D ratio = 0.1		Supplementary 005425
83-3(b) Developmental Toxicity Study Species: rat/dlt Rohm and Haas 68R-021; 3/31/67	Mancozeb 83.0% pure; lot 056530; [redacted] ETU	404330-01	Levels tested by gavage on gestation days 7 to 19 in M.Z.W. strains: 0, 10, 30 and 80 mg/kg. Maternal NOEL = 30 mg/kg. Maternal LEL = 80 mg/kg (death, ataxia, abortion etc). Developmental NOEL > 80 mg/kg (NDT).		Minimum 006679 007092
83-3(b) Developmental Toxicity Study Species: rat/dlt Rohm and Haas 68R-021; 3/31/67	Dithane N-45 (83% a.i., Mancozeb)	404330-01	Doses tested: 0, 10, 30, 80 mg/kg by gavage, on days 7-19 of gestation. Maternal NOEL = 10 mg/kg. Maternal LEL = 30 mg/kg (death) Developmental NOEL > 80 mg/kg (NDT).		Minimum 006679
83-4 Reproduction 3 generation Species: rat Rohm and Haas 3/4/68	Mancozeb 80% a.i.	00080715	Reproductive NOEL = 100 ppm. Reproductive LEL = 1000 ppm (decreased fertility). Doses: 25, 100, 1000 ppm		Supplementary 002493 005425
83-4 Reproduction Species: rat Rohm and Haas 87R-020; 3/17/68	Mancozeb Tech. (86%)	413652-01	Doses tested: 0, 30, 120, 1200 ppm in the diet over two generations. Parental NOEL = 30 ppm (1.5-2.5 mg/kg/day). Parental LEL = 120 ppm (incr liver weight in P2 males; renal pigment in both sexes). Reproductive NOEL > 1200 ppm (NDT).		Minimum 008038
82-5 Neurotoxicity 90 day Species: rat Haskell Lab 217-89; 06/19/91	Mancozeb, 79.3% a.i.	420341-01	When administered to CDAR rats, the NOEL for mancozeb was 125 ppm (0.21 mg/kg, males & 10.5 mg/kg, females) and the LOEL = 750 ppm (49.7 mg/kg/d males, & 63.5 mg/kg/d, females) based on the histological observation of demyelination, Schwann cell proliferation, ballooned myelin sheaths, myelin phagocytosis, sheath thickening and the presence of myelin ovoids and debris. At 5000 ppm there were 5 deaths (1 male & 4 females), and clinical signs of neuropathology which included reluctance to walk, abnormal gait, limited or no use of hind limbs, atrophy of posterior thigh muscles. Doses tested: 0, 20, 125, 750 & 5000 ppm (0, 1.35, 8.21, 49.7 & 339 mg/kg for males & 0, 1.67, 10.5, 63.5 and 312-47 mg/kg for females).		Acceptable 008844

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MANUFACTURING PROCESS INFORMATION IS NOT INCLUDED

INERT INGREDIENT INFORMATION IS NOT INCLUDED

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TOXICITY NO. V13A. Zinc ion and manganese ethylene bisdithiocarbamate (coordination product of Mn 16%, Zn 2%, ethylene bisdithiocarbamate 62%)

CITATION	MATERIAL	ACCESSION/ HRID NO.	RESULTS	TOX CAT	COREGRADE/ DOCUMENT#
B4-2(a) Mutagenic: Ames Species: rat S-9 Rohm and Haas 84R-0059; 6/21/84	Dithane M-45 88% a.i.	259044 IMWZ08	No incr. reversion in Salmonella/microsome system with or without activation (Fischer-344) rat S-9 into cytotoxic range, 250 ug/plate	Acceptable 005418 005425	
B4-2(a) Mutagenic: Ames Species: salmonella Rohm and Haas 84R-0060; 6/21/84	Dithane M-45 88% a.i.	259044	No incr. reversion in Salmonella/microsome system with or without activation (86-3f1 mouse S-9) into cytotoxic range, 250 ug/plate	Acceptable 005418	
B4-4 Mutagenic: host med. Species: mice (with TA 1530) Rohm and Haas 84R-RC-258; 9/26/84	Dithane M-45 88% a.i.	259044	Doses: 0, 0.5, 2 & 5 mg/kg by oral gavage to B6C3F1 mice. No incr. reversion in Sal. TA1530 indicator at any dose. Dose range insufficient	Unacceptable 005418	
B4-4 Mutagenic: host med. Species: mice Rohm and Haas 85RC-48; 7/1/85	Dithane M-45 88% a.i.	259044	Doses: 0, 500, 2000 & 5000 mg/kg by gavage to B6C3F1 mice. No incr. reversion in Salmonella str. TA1530 at the HDT.	Acceptable 005418 Acceptable 005425	
B4-4 Mutagenic: (HGPRT) Species: mammalian cell Rohm and Haas 84R-207; 2/11/85	Dithane M-45 88% a.i.	259044 IMWZ08	Negative for incr. thioguanidine resistant mutants with or without S-9 from Fischer 344 rat or B6C3F1 mice at cytotoxic doses (14-45 ug/ml)	Acceptable 005418 005425	
B4-4 Mutagenic: unscheduled DNA synt Species: Rohm and Haas 84R-28; 5/29/85	Dithane M-45 88% a.i.	259044	Although reported as negative for UDS at levels up to 5 ug/ml, the pos. dose rel. incr. in nuclear grain counts indicates assay should be repeated.	Inconclusive 005418	
B4-2(b) Mutagenic: in vivo cytogenetic Species: rat Rohm and Haas 84R-246; 12/21/84	Dithane M-45 88% a.i.	259044 IMWZ08	Doses: 0, 440, 1760 & 4400 mg/kg by gavage either once or repeated daily for 5 days. No incr. chrom aberrations at the HDT (appr. LD50)	Acceptable 005418 005425	

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TOXICITY NO. 913A-Zinc ion and manganese ethylene bisdithiocarbamate (coordination product of Mn 16%, Zn 2%, ethylene bisdithiocarbamate 62%)

CITATION	MATERIAL	ACCESSION/ NRID NO.	RESULTS	TOX CAT	COREGRADE/ DOCUMENT#
B4-2(b) Mutagenic sister chromatid exchange Species: CHO cells Lifton Biometrics Inc. 20990; 3/1985	Dithane M-45	259044 IMHZ08	Positive: significant dose related incr. in sister chromatid exchange in non-activated doses of: 5, 7.5, 10, 12.5 & 15 ug/ml. Signif. (but not dose related), incr. in both mouse S 9 & rat S-9 activated assays.		Acceptable 005418 005425
B4-4 Mutagenic cell transformation Species: mice (LSH-101 1/2) Rohm and Haas B&K 055; 11/19/84	Dithane M-45 88% a.i.	259044 IMHZ08	Negative for incr. in transformed foci at doses ranging fr. 0.25-0.5 ug/ml (dose related cytotoxic range)		Acceptable 005418 005425
B4-2(d) Mut. in vivo transformation Species: mouse (LSH-101 1/2) Rohm and Haas 3/29/85	Dithane M-45	259044	Negative for promoting morphological transformation initiated by known carcinogens (HMG, DMBA, MCA), one non-toxic conc: 0.1 ug/ml (ODT). This dose was just below that which caused cell toxicity.		Unacceptable 005418 Acceptable 006486
B4-2(d) Mutagenic-DNA damage/repair Species: Rohm and Haas B&K 200; 12/21/84	Marcoseb tech 88% a.i.	259044 IMHZ08	Presumptively pos. for unscheduled DNA synthesis in rat hepatocytes treated at 1, 2.5, & 5.0 ug/ml. Procedural prob. indicate assay should be repeated.		Inconclusive 5425
B4-4 Mutagenic promotion in vitro Species: Rohm and Haas B&K 297; 3/29/85	Marcoseb tech. 88% a.i.	259044 IMHZ08	Reported negative for carcinogen-initiated cells exposed to only one non-toxic dose.		Unacceptable 005425
B4-4 Mutagenic host med. Species: mice Rohm and Haas B&K-48; 7/1/84	Marcoseb tech. (88% a.i.)	259044 IMHZ08	Negative for reversion of S. typh 646 incubated in mice treated up to 500 mg/kg.		Acceptable 005425
B4-4 Mutagenic unscheduled DNA synth Species: rat hepatocytes 4/29/88 B&K 079	Dithane M-45 Tech. 82.4%	406117-01	Negative for inducing unscheduled DNA synthesis (repair) in primary rat hepatocytes cultured in vitro at concentrations up to toxic levels, 2 to 10 ug/ml.		Acceptable 006784

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TOXIC CHEM NO. 9153A-Zinc ion and manganese ethylene bisdithiocarbamate (coordination product of Mn 16%, Zn 2%, ethylene bisdithiocarbamate 62%)

CITATION	MATERIAL	ACCESSION/ MRID NO.	RESULTS	TOX CAT	CORE GRADE/ DOCUMENT#
84-4 Mutagenic cell transformation Species: mice (C3H-101 1/2) 11/19/84 84R-056	Mankozeb 99.8%	259044	Negative at 100, 330, and 1000 ug/ml		Acceptable 005418 005425
84-2(b) Mutagenic DNA repair test Species: e coli Huntingdon Res. Centre, Eng. FWI 37/863/6; 4/21/86	Mankozeb tech (88.2%)	40810201	Presumptively positive for differential toxicity in repair deficient E. coli strain, more severe without activation. Inconclusive because of data inconsistencies.		Inconclusive 006987
84-2(b) Mutagenic cytogenetic Species: CHO cells Huntingdon Res. Centre, Eng. PW138/86855; 10/7/86	Mankozeb tech (88.2%)	40810202	Presumptively positive for dose-related chromosome damage in a single assay Reportedly negative for induction of HPRT mutants in Chinese hamster ovary cells. Inconclusive because of procedural deficiencies.		Inconclusive 006987
84-4 Mutagenic gene mutation Species: CHO/hprt Huntingdon Res. Centre, Eng. PW141/861125; 2/11/84	Mankozeb tech 88.2%	40810203	Presumptively positive for dose-related chromosome damage in a single assay Reportedly negative for induction of HPRT mutants in Chinese hamster ovary cells. Inconclusive because of procedural deficiencies.		Inconclusive 006987
84-2(a) Mutagenic Ames Species: bacteria Huntingdon Res. Centre, Eng. PW136/86374; 2/9/88	Mankozeb tech 88.2%	40810204	Reportedly negative in repeat-tests up to cytotoxic doses. Inconclusive due to lack of reporting some procedural deficiencies.		Inconclusive 006987
84-4 Mutagenic micronucleus assay Species: mouse Huntingdon Res. Centre, Eng. PW139/86637; 7/21/87	Mankozeb tech 88.2%	40778901	Negative for induction of micronuclei at 10,000 mg/kg which causes toxicity.		Acceptable 006987
84-2(b) Mutagenic DNA repair test Species: hela/ods Huntingdon Res. Centre, Eng. PW140/86899; 10/22/86	Mankozeb tech 88.2%	40810205	Inconsistent and sporadic increased grain counts in replicate trials Can not be interpreted.		Unacceptable 006987

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TOXCHEM NO. 913A- Zinc ion and manganese ethylene bisdithiocarbamate (coordination product of Mn 16%, Zn 2%, ethylene bisdithiocarbamate 62%) FILE LAST PRINTED: 03/09/86

CITATION	ACCESSION/ MRID NO.	MATERIAL	RESULTS	TOX CAT	COREGRADE/ DOCUMENT#
Function & Morph of Thyroid Species: rat Rohm and Haas 3/4/68	080715 080715	Mancozeb 80% a.i.	MOEL = 300. LEL = 1000 ppm (increased thyroid/body weight) Doses: 100, 300, 1000 ppm.		002493 Supplementary 005425
Exposure Species: human	00130638	Dithane M-45	No adverse effect observed in 54 men exposed during the manufacturing of Dithane M-45.		003244
Exposure Species: human (applicators) 2/17/83	00130638	Dithane M-45	EIU but not parent detected in urine of aerial applicators at a level of 0.2 ppm. Urine of miners & loaders was neg in 2 trials in Mich. & Minn. All trials other state - neg. These results suggest that agricultural use of mancozeb, and probably other EBDC's, results in at least some applicator exposure to the parent compound and the common metabolite, EIU. Quantification of this exposure is not possible from these data, as presented.		004726
85-1 Metabolism Species: rat Medical College of Virginia 12/30/65	00080713	Mancozeb tech.	3 week feeding at 0, 100, 300, and 1000 ppm. Thyroid dysfunction in 1000 ppm animals. Hyperplasia seen in thyroid of 1 of ten males & 1/10 female examined from this 1000 ppm group.		Supplementary 005425
Registration standard 1986		Mnacozeb			005425
85-1 Metabolism Species: rat Rohm and Haas 85R-123 (31H-86-02; 5/21/85)	262834 262835 1HMZ09	Mancozeb C-14 Tech. (84.4% a.i.)	Doses: 1.5 - 100 mg/kg (k1, oral). 50% of oral dose absorbed; excreted equally in urine/feces; rapidly metabolized to EIU & intermediates (EIO, EBIS, EDA, etc); accumulates in maj. organs, highest in thyroid. residue anal for EIU = 1 ppm in thyroid during 24 hr. after high dose (only). Undetectable thereafter.		Minimum 005425
85-2 Metabolism - dermal absorption Species: rat Springhouse Res. Labs 34F-80-9; 5/8/80	250063 00127950	Dithane M-45 (8.3% mancozeb)	Approx. 1% of mancozeb in a 10 mg dose of dithane M-45 is absorbed thru the skin of female rats following a 6 hr. applic. Only one dose was tested with no justification for dosage selection.		Acceptable 003997 Unacceptable 006486
Exposure Species: human	00130638		No adverse effects observed in 54 men exposed during the manufacture of Dithane M-45.		002493 003244 005425

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TOXIC CHEM NO. 913A- Zinc Ion and manganese ethylene bisdithiocarbamate (coordination product of Mn 16%, Zn 2%, ethylene bisdithiocarbamate 62%)

CITATION	MATERIAL	ACCESSION/ NRID NO.	RESULTS	TOX CAT	COREGRADE/ DOCUMENT#
85-2 Dermal penetration Species: rat Rohm and Haas 81R 218; 11/29/88	Commercial Dithane M 45 (80.6% Mancozeb)	409554-01	50 ul of aqueous material was applied to shaved dorsal areas of male rats at two dose levels, 100 or 1000 ug/cat, samples from the application sites, urine feces and carcass analyzed for parent and ETU. Definitive recoveries and analyses of biological samples could not be made due to "background interference".		Unacceptable 007142
85-1 Metabolism Species: mice Inveresk Research, Scotland IRI 137823; 4909; 2/6/90	C41-Ethylene-U-14C-labeled Mancozeb (C14-Mancozeb)	416563-01	Mancozeb was rapidly absorbed, extensively metabolized, and rapidly excreted in mice following oral administration of C14-ethylene-U-labeled mancozeb (C14-Mancozeb) at 2.5 and 150 mg/kg and at repeated (16 daily doses) of unlabeled mancozeb at 2.5 mg/kg followed by administration of labeled mancozeb at 2.5 mg/kg. Over a 7 day period, most (97-103%) of the test compound administered was excreted from the animals. The radioactivity recovered in urine, feces, CO <sub>2</sub> , and CS <sub>2</sub> in the exhaled air was 26-44, 48-64, 0.4-4.2, and up to 3.9% of the dose respectively. Elimination of absorbed radioactivity via bile was not significant (less than 0.2% of the dose). Less than 1.4% of the dose remained in carcass and tissues after 7 days. Peak tissue (including plasma) concentration of radioactivity occurred 1 hour after the administration of the test compound. One of 4 major metabolites in the urine was identified to be ethylenethiourea (ETU), less than 5% of the dose. This study is supplementary because the identification of the major mancozeb metabolite was not completed. However, there is a satisfactory rat metabolism study in which metabolites were identified, therefore, the toxicology data requirement for metabolism (85-1) has been satisfied.		Supplementary 008432
81-1 Acute oral LD50 Species: rat Haskell Lab 876 80; 10/22/80	Mancozeb ( a coordination prod. of zinc & manganese ethylene bis dithio- carbamate	244298	LD50 > 5000 mg/kg (only dose tested)	4	Guideline 000809
81-1 Acute oral LD50 Species: rat Rohm and Haas 79R-180; 1/21/80	Manganese 16%, zinc 2%, ethylene bisdithiocarbamate 62%	246662	LD50 > 5 gm/kg (M)	4	Minimum 002803
81-1 Acute oral LD50 Species: rat Rohm and Haas	Mancozeb flowable (36% a.i.)	238564	LD50 > 5 gm/kg (M)	4	Minimum 003245

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TOXICUM NO. 913A- Zinc (zinc) and manganese ethylene bisdithiocarbamate (coordination product of Mn 16%, Zn 2%, ethylene bisdithiocarbamate 82%)

CITATION	MATERIAL	ACCESSION/ NRID NO.	RESULTS	TOX CAT	COREGRADE/ DOCUMENT#
81-1 Acute oral LD50 Species: rat Rohm and Haas 6/5/79	Mancozeb 35% a.i.	238564	LD50 > 5000 mg/kg (only dose tested)	4	Minimum 005426
81-1 Acute oral LD50 Species: rat Sandoz Winder, Inc. CBK-5441-82; 5/4/82	Mancozeb (SAN 518F); 8.3% SAN 371F & 70% Dithane M-45	071359	LD50 (F) = 9654 mg/kg. LD50 (M) = 13,266 mg/kg. Doses: 4.0, 5.0, 6.4, 8.0, 10.0, 12.5, 16.0 g/kg	4	Minimum 005426
81-1 Acute oral LD50 Species: rat Sandoz Winder, Inc. LBA 5345-82; 3/5/82	Mancozeb 56%; SAN 371F 10%.	071359	LD50 = 6591 mg/kg (F). Doses: 2500, 3200, 4000, 5000, 6400, 8000, 10,000 mg/kg	4	Minimum 005426
81-1 Acute oral LD50 Species: rat Sandoz Winder, Inc. LBA 5355-82; 1/27/82	Mancozeb 56%; SAN 371F 10%.	071359	LD50 (M) = 7794 mg/kg. Doses: 1000, 5000, 6400, 8000, 10,000, 12,500 mg/kg	4	Supplementary 005425
81-1 Acute oral LD50 Species: rat Rohm and Haas 83R-213A; 9/24/84	Dithane M-45 Lot #0842 Tech. 80% a.i.	259044	LD50 > 5000 mg/kg (M)	4	Minimum 005426 Supplementary 005425
81-1 Acute oral LD50 Species: rat Rohm and Haas 83R-213B; 9/24/84	Dithane M-45 Lot #0842 Tech. 80% a.i.	259044 1M0002	LD50 > 5000 mg/kg (M)	4	Minimum 005426 Supplementary 005425
81-1 Acute oral LD50 Species: rat Rohm and Haas 83R-218; 9/21/84	Dithane M-45 Lot #0842 80% a.i.	259044 1M0002	LD50 > 5000 mg/kg (M)	4	Minimum 005426 Supplementary 005425

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IONCHEN NO. 913A - Zinc ion and manganese ethylene bisdithiocarbamate (coordination product of Mn 16%, Zn 2%, ethylene bisdithiocarbamate 62%) FILE LAST PRINTED: 03/04/79

CITATION	MATERIAL	ACCESSION/ NRID NO.	RESULTS	ION (CAT)	MINIMUM (U09625)
81-1 Acute oral LD50 Species: rat Robin and Haas 83R-086A; 6/20/83	Mancozeb Tech. (72.6%)	00142522	LD50 > 5000 mg/kg (M & F)	4	Minimum U09625
81-1 Acute oral LD50 Species: rat Units of Miami 1/11/65	Zinureb Tech 80% a.i.	00047146	LD50 = 4500 mg/kg (M & F) (3600-5700 mg/kg)	3	Minimum U09625
81-1 Acute oral LD50 Species: Robin and Haas 3/4/68	Mancozeb Tech 86%		LD50 > 8000 mg/kg. Levels tested: 4, 6, 8 gm/kg	4	U09625
81-1 Acute oral LD50 Species: rat Stillmeadow Inc. 2436 81; 2/2/82	Metalyhl: N(2,6-dimethyl)- N-(methoxyacetyl)alanine methyl ester 10% Mancozeb coordin. prod of Zn & Mn ethylene bis dithiocarb.	247494	LD50 (M) > 5990 mg/kg. LD50 (F) = 3608 mg/kg (3115-4180) LD50 (combined) = 5735 mg/kg (3556-9248)	3	Underline U09631
81-1 Acute oral LD50 Species: rat Robin and Haas 83R-086A, 83R-086B; 6/20/83	Mancozeb 70 & 75%	254377	LD50 > 5000 mg/kg. Dose: 500 mg/kg.	4	Underline U06441
81-1 Acute oral LD50 Species: rat Scientific Associates Inc. 04/13/77	Duosan sample EK-368 (Thiophanate methyl 15%; Mancozeb 63%)	63143	LD50 = 10.25 g/kg.	4	U08992
81-1 Acute oral LD50 Species: rat Pinksis Safety Labs 1-729; 05/15/91	Mancozeb- 50%; Lindane -18.75% Lot/batch# 3021019	419118-01	LD50 (M) = estimated 400 mg/kg. LD50 (F) = 290 (260-320) mg/kg. LD50 (combined) = 350 (280-430) mg/kg.	2	Minimum U09319

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TOXIC CHEM. NO. 913A- Zinc ion and manganese ethylene bisdithiocarbamate (coordination product of Mn 16%, Zn 2%, ethylene bisdithiocarbamate 62%)

CITATION	MATERIAL	ACCESSION/ MRID NO.	RESULTS	TOX CAT	COREGRADE/ DOCUMENT#
81-2 Acute Dermal LD50 Species: Rabbit Haskell Lab 875-80; 10/14/80	Mancozeb (A coordination prod. of zinc ion & manganese ethylenebis dithio carbamate 35%	244298	LD50 > 2000 mg/kg (only dose tested)	3	Guideline 000809
81-2 Acute Dermal LD50 Species: Rabbit Rohm and Haas 79R-180; 1/21/80	Manganese 16%; Zinc 2%; Ethylene bisdithiocarbamate 62%	246662	LD50 > 5 gm/kg (M)	3	Minimum 002803
81-2 Acute Dermal LD50 Species: Rabbit Rohm and Haas	Mancozeb flammable; 56% a.i.	238564	LD50. 5 gm/kg (M) (only dose tested)	3	Minimum 003245
81-2 Acute Dermal LD50 Species: Rabbit Rohm and Haas 6/5/79	Mancozeb 35% a.i.	238564	LD50 > 5000 mg/kg (only dose tested)	3	Minimum 002494
81-2 Acute Dermal LD50 Species: Rat Sandoz Wainder Inc. CBK 5342-82; 3/5/82	Mancozeb 56%; SAN 371F 10%.	071359	LD50 > 2 gm/kg (only dose tested)	3	Minimum 003836
81-2 Acute Dermal LD50 Species: Rabbit Rohm and Haas 83R-086A; 6/20/83	Mancozeb Tech 72.6% a.i.	00142522	LD50 > 5000 mg/kg	3	Minimum 005425
81-2 Acute/subacute dermal Species: rabbit Univ of Miami 1/11/65	Zinaneb Tech. 80% a.i.	00047146	LD50 (M & F) > 10,000 mg/kg. No effect of 5 days treatment at 5000 mg/kg.	3	Minimum 005425

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TOXICEM NO. 913A- Zinc ion and manganese ethylene bisdithiocarbamate (coordination product of Mn 16%, Zn 2%, ethylene bisdithiocarbamate 62%) FILE LAST PRINTED: 03/09/9

CITATION	MATERIAL	ACCESSION/ MRID NO.	RESULTS	TOX CAT	COREGRADE/ DOCUMENT#
81-2 Acute Dermal LD50 Species: rabbit Stillmeadow Inc. 2437-81; 1/82	Metaxyl: (2,6-dimethyl)- N-(methoxyacetyl)alanine methyl ester 10% Mancozeb coordination prod. of Zn & Mn ethylenebisdithiocarbamate	247294	LD50 > 2010 mg/kg	3	Guideline 005431
81-2 Acute Dermal LD50 Species: rabbit Rohm and Haas 83R-080A; 6/20/83	Mancozeb 70% & 75%	254377	LD50 > 5000 mg/kg. Dose: 5000 mg/kg.	4	Guideline 006441
81-2 Acute Dermal LD50 Species: rabbit Scientific Associates Inc.	Duosan sample EH-368 (Thiophanate methyl 15%; Mancozeb 63%)	63143	LD50 = 78 g/kg.	4	Invalid 008992
81-2 Acute Dermal LD50 Species: rabbit (limit test) Products Safety Labs 1-730; 04/16/91	Mancozeb- 50%; Lindane -18.75% Lot/batch# 3021019	419118-02			Supplementary 009319
81-3 Acute Inhalation LC50 Species: rat Rohm and Haas 79R-132; 12/18/80	Mancozeb (A coordination prod. of zinc & manganese ethylene bisdithiocarbamate 35% (707-156)	244505	LC50 > 0.35 mg/L - only dose tested. (gravimetric concentration)	2	Minimum 001243
81-3 Acute Inhalation LC50 Species: rat 1-21/80 81R-171	Manganese 16%; Zinc 2%; Ethylene bisdithiocarbamate ion 62%	246662	LC50 > 5.14 mg/L	4	Guideline 002803
81-3 Acute Inhalation LC50 Species: rat Sandoz-Wander Inc. CBA 5453-82; 5/10/82	Mancozeb 56%; SAM 3/11 10%	071359	LC50 > 15.4 mg/L/4 hr. (only dose tested)	3	Minimum 003638

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TOUNCHEN NO. 913A- Zinc Ion and manganese ethylene bisdithiocarbamate (coordination product of Mn 16%, Zn 2%, ethylene bisdithiocarbamate 62%)

CITATION	MATERIAL	ACCESSION/ NRID NO.	RESULTS	TOX CAT	CORRECTION/ DOCUMENT#
81-3 Acute inhalation LC50 Species: rat Univ of Miami 1/11/65	"Zimateb" Tech. 80% a.i.	0004/146	LC50 > 6.85 mg/L. Actual chamber conc. and respirable particle size not determined.	4	Supplementary 005425
81-3 Acute inhalation LC50 Species: rat Toxigenics Inc. 420-0844; 2/10/82	Metalyal-N(2,6-dimethyl)-N-(methoxyacetyl)alanine methyl ester 10% Mancozeb a coordin prod Zn & Mn ethylenebisdithiocarbamate	247494	LC50 > 2.36 mg/L	3	Guideline 005431
81-3 Acute inhalation LC50 Species: rat Rohm and Haas 81R; 1/16/82	Mancozeb 70 & 75%	254377	LC50 > 5.14 mg/L - Analytical conc. - 5.14	4	Guideline 006441
81-3 Acute inhalation LC50 Species: rat Will Research Lab	Duoson sample EH-368 (Thiophanate methyl 15%; Mancozeb 63%)	63143	No particle size, no chamber concentrations.		Invalid 008992
81-3 Acute inhalation LC50 Species: rat (limit test) Products Safety Labs 1-731; 05/31/91	Mancozeb 50%; Lindane - 18.75% Lot/batch# 3021019	419118-03	LC50 > 1.07 mg/L	3	Guideline 009319
81-4 Primary eye irritation Species: rabbit Haskell Lab 826-80; 8/25/80	Mancozeb (A coordination prod. of zinc & manganese ethylene bisdithiocarbamate 35%.	244298	Corneal opacity in 6/6 treated, unwashed eyes & 3/3 treated washed eyes. Conjunctive redness, swelling & discharge in most animals.	2	Guideline 000809
81-4 Primary eye irritation Species: Rohm and Haas	Mancozeb Flowable 36% a.i.	238564	PI5 = 0	4	Guideline 003245

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TOXICEM NO. 913A- Zinc ion and manganese ethylene bisdithiocarbamate (coordination product of Mn 16%, Zn 2%, ethylene bisdithiocarbamate 62%)

CITATION	MATERIAL	ACCESSION/ NRID NO.	RESULTS	TOX CAT	COREGRADE/ DOCUMENT#
81-4 Primary eye irritation Species: rabbit Rohm and Haas 6/5/79	Mancozeb 35% a.i.	238564	PLS = 0 at 24 hrs. No corneal opacity.	3	Guideline 002494
81-4 Primary eye irritation Species: rabbit Sandoz-Mander Inc. EPA 5352-82; 1/27/82	Mancozeb 56%; SAN 371F 10%.	071359	Conjunctival irritation, reversible within 7 days.	3	Guideline 003838
81-4 Primary eye irritation Species: rabbit Rohm and Haas 83R-080A; 6/20/83	Mancozeb Tech. 72.6% a.i.	00142522	PLS (72 hr.) = 2.3	3	Minimum 005425
81-4 Primary eye irritation Species: rabbit Stillmeadow Inc. 2438-81; 1/28/782	Metatexyl:(2,6-dimethyl) -N-(methoxyacetyl)alanine methyl ester 10% Mancozeb a coordin prod Zn & Mn ethylenebisdithiocarbamat	247494	24 hrs: 5/9 with iris irritation (5/9 = 5), 7/9 with conjunctival irrit. (scores < 3). Day 4: 3/9 with corneal opacity (1/9 = 5, 1/9 = 10, 1/9 = 15), conjunctival irritation. day 16: No corneal opacity or other irritation present.	3	Guideline 005431
81-4 Primary eye irritation Species: rabbit Rohm and Haas 83R-080A; 6/20/83	Mancozeb 70 & 75%	254377	24 hrs: 5/6 of unwashed & 1/3 of washed had hazy cornea after staining. 7 days: all irritation & opacity cleared.	3	Guideline 006441
81-4 Primary eye irritation Species: rabbit Wil Research Lab	Duosan sample EH-368 (Thiophanate methyl 15%; Mancozeb 65%)	63143	Conjunctival irrit. present at 72 hrs; corneal opacity present @ 72 hrs.	2	008992
81-4 Primary eye irritation Species: rabbit Prokats Safety Labs 1-730; 05/20/91	Mancozeb- 50%; Lindane -16.75% Lot/batch# 3021019	419118-04	Irritation cleared by day 21.		Guideline 009319

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CITATION	MATERIAL	ACCESSION/ NRID NO.	RESULTS	TOX CAT	CORRECTION/ DOCUMENT#
81-5 Primary dermal irritation Species: rabbit Haskell Lab 825-80; 6/25/80	Mancozeb (A coordination prod. of zinc & manga- nese ethylene bisdithiocar- bamate 35%)	244298	Slight to well defined erythema & edema at 24 hrs & persisted in 3/6 animals thru day 9, but all irrit. clear by day 10.	3	Guideline 000809
81-5 Primary dermal irritation Species: rabbit Rohm and Haas 79R 180; 1/21/80	Manganese 16%; Zinc 2%; Ethylene bisdithiocar- bamate 10% 62%	246662	At 24 hr. slight erythema. At 72 hrs slight erythema. PIS = 0.5	4	Guideline 002803
81-5 Primary dermal irritation Species: rabbit Rohm and Haas	Mancozeb flowable 36% a.i.	238564	PIS = 0.4/8.0	4	Guideline 003245
81-5 Primary dermal irritation Species: rabbit Rohm and Haas 6/5/79	Mancozeb 35% a.i.	238564	PIS = 0.4	4	Guideline 002494
81-5 Primary dermal irritation Species: rabbit Sandoz-Walder Inc. CBA 5353-82; 1/27/82	Mancozeb 56%; SAN 371F 10%	071359	PIS = 0.0 at 24 and 72 hr.	4	Guideline 003636
81-5 Primary dermal irritation Species: rabbit Rohm and Haas 83R-086A; 6/20/83	Mancozeb Tech. 72.6% a.i.	00142522	PIS (72 hr.) = 0.2	P	num 5425
81-5 Primary dermal irritation Species: rabbit Univ of Miami 1/11/65	"Zimaneb" tech. 80% a.i.	00047146	No irritation reported from treatment at 2000 mg/kg. too few animals tested.		Supplementary 005425

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TOXCAT NO. 913A Zinc ion and manganese ethylene bisdithiocarbamate (coordination product of Mn 16%, Zn 2%, ethylene bisdithiocarbamate 62%)

CITATION	MATERIAL	ACCESSION/ RRID NO.	RESULTS	TOX CAT	COREGRADE/ DOCUMENT#
81-5 Primary dermal irritation Species: rabbit Stillmeadow Inc. 2439-81; 1/20/82	Metalaeryl-N(2,6-dimethyl) -N-(methoxyacetyl)alanine methyl ester 10% Mancozeb a coordin. prod Zn & Mn ethylenebisdithiocarbamat	247494	24 hrs: 6/6 with erythema (5/6 = 1, 1/6 = 2) & edema (4/6 = 1, 2/6 = 2). 72 hrs: no irritation. PIS = 1.13	4	Guideline 005431
81-5 Primary dermal irritation Species: rabbit Rohm and Haas 83R-086A; 6/20/83	Mancozeb 70 & 75%	254377	72 hrs: 1/6 had slight erythema & desiccation. 7 days: desiccation persisted.	4	Guideline 006441
81-5 Primary dermal irritation Species: rabbit Scientific Associates Inc. 235963; 07/15/77	Duosan sample EH-368 (thiophanate methyl 15%; Mancozeb 63%)	237775	Average irritation score @ 72 hrs: intact - 0.3; abraded - 1.3.	4	Guideline 008992
81-5 Primary dermal irritation Species: rabbit Prokats Safety Labs 1-731; 05/10/91	Mancozeb- 50%; Lindane -18.75% Lot/batch# 3021019	419118-05			Supplementary 009319
81-6 Dermal sensitization Species: guinea pig Stillmeadow Inc. 2440-81; 2/12/82	Metalaeryl-N(2,6-dimethyl) -N-(methoxyacetyl)alanine methyl ester 10% Mancozeb a coordin. prod Zn & Mn ethylenebisdithiocarbamat	247494	sensitizing agent		Guideline 005431
81-6 Dermal sensitization Species: guinea pig Hazleton 417-431 (87RC0070); 1/4/89	Dithane M-45 Tech.				Guideline 006744
81-6 Dermal sensitization Species: guinea pig Products Safety Labs 1-733; 05/10/91	Mancozeb- 50%; Lindane -18.75% Lot/batch# 3021019	419118-06	Not a sensitizer following two sequential challenges at a concentration of 50% (w/w).		Supplementary 009319

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