

表6. 続き(1)

Chemical	Animal	Route	Dose/Concentration
N,N-dimethyl-N'-(fluorodichloromethylthio)-N"-phenylsulfamide	Rabbit	Oral	3500 mg/kg
	Guinea Pig	Oral	945 mg/kg
	Cat	Oral	1 g/kg
	Chicken	Oral	>1 g/kg
	Quail (Laboratory)	Oral	>5 g/kg
2-(4-Thiocyanomethylthio)benzothiazole	Rat	Intraperitoneal	73 mg/kg
		Oral	2 g/kg
	Mouse	Subcutaneous	1300 mg/kg
		Skin	>5 g/kg
		Intraperitoneal	143 mg/kg
		Oral	445 mg/kg
Rabbit	Subcutaneous	205 mg/kg	
	Skin	10 g/kg	
2-(4-Thiocyanomethylthio)benzothiazole, 80%	Rat	Oral	2538 mg/kg
	Rabbit	Skin	10 g/kg
2-(4-Thiocyanomethylthio)benzothiazole, 60%	Rat	Inhalation	>170 mg/m <sup>3</sup>
		Oral	1590 mg/kg
	Rabbit	Skin	200 mg/kg
	Duck	Oral	1310 mg/kg
2-(4-Thiocyanomethylthio)benzothiazole, 30%	Rat	Oral	679 mg/kg
	Rabbit	Skin	642 mg/kg
2-Hydroxy-4-isopropyl-2,4,6-cycloheptatrien-1-one	Rat	Oral	500 mg/kg
		Subcutaneous	500 mg/kg
	Guinea Pig	Intraperitoneal	85 mg/kg
		Intravenous	128 mg/kg
	Rabbit	Subcutaneous	541 mg/kg
		Skin	>2 g/kg
2,4,5,6-tetrachloroisophthalonitrile	Rat	Inhalation	310 mg/m <sup>3</sup> /1H
		Oral	10 g/kg
	Mouse	Skin	>2500 mg/kg
		Intraperitoneal	2500 µg/kg
	Rabbit	Oral	3700 mg/kg
		Skin	>10 g/kg
Dog	Oral	>5 g/kg	

\* \*  
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\* \*  
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表6. 続き(2)

Chemical	Animal	Route	Dose/Concentration
Zinc bis(2-pyridylthio-1-oxide)	Rabbit	Intravenous	10 mg/kg * *LDLo
	Dog	Intravenous	25 mg/kg * LDLo
	Monkey	Intravenous	25 mg/kg * LDLo
	Rat	Inhalation	140 mg/m <sup>3</sup> /4H ** **LC50
		Oral	177 mg/kg
	Mouse	Intraperitoneal	26800 µg/kg
		Oral	160 mg/kg
		Subcutaneous	730 mg/kg
		Skin	100 mg/kg
	Rabbit	Oral	>2 g/kg
Guinea Pig	Oral	600 mg/kg	
Dog	Oral	140 mg/m <sup>3</sup> /4H ** LC50	
Mammal - Unspecified Species	Inhalation		
2,3,5,6-tetrachloro-4-(methylsulfonyl)pyridine	Mouse	Oral	770 mg/kg
	Woman	Oral	6 ml/kg
4-Chloro-3,5-dimethylphenol	Rat	Oral	3830 mg/kg
	Rat	Oral	115 g/kg
	Mouse	Intraperitoneal	1 g/kg
		Oral	
4-Chloro-3-methylphenol	Rat	Oral	1830 mg/kg
	Mouse	Subcutaneous	400 mg/kg
		Intravenous	70 mg/kg
	Rat	Oral	600 mg/kg
		Subcutaneous	360 mg/kg
	2-Chloroacetamide	Rat	Oral
Mouse		Unreported	70 mg/kg
		Intraperitoneal	100 mg/kg
Rabbit		Intravenous	180 mg/kg
		Oral	155 mg/kg
		Oral	122 mg/kg
Dog		Oral	31 mg/kg
Isobornyl thiocyanacetate	Rat	Oral	1 g/kg
	Mouse	Intraperitoneal	140 mg/kg
	Rabbit	Oral	630 mg/kg
		Skin	6 g/kg
	Guinea Pig	Oral	551 mg/kg

表6. 続き(3)

Chemical	Animal	Route	Dose/Concentration	
10,10'-Oxy-bis(phenoxyarsine)	Mouse	Oral	42 mg/kg	* LDLo
	Guinea Pig	Inhalation	141 mg/m <sup>3</sup> /2H	*** LCLo
	Rat	Oral	40 mg/kg	
	Guinea Pig	Oral	24 mg/kg	
	Bird - Wild Bird Species	Oral	24 mg/kg	

\* LDLo = lowest published lethal dose

\*\* LC50 = lethal concentration 50% kill

\*\*\* LCLo = lowest published lethal concentration

表7. Draize試験での皮膚及び眼刺激性データ (RTECSより抜粋)

Chemical	Route	Animal	Dose	Reaction
2-Bromo-2-nitropropane-1,3-diol	Skin	Human	10 mg	Moderate
		Rat	0.2%	Not reported
		Rabbit	500 mg/24H	Mild
		Rabbit	80 mg	Moderate
	Eyes	Rabbit	5 mg	Not reported
1,2-Benzisothiazolin-3-one	Skin	Human	1%/1H	Not reported
			5%/48H	Mild
2-(4-Thiocyanomethylthio)benzothiazole, 30%	Skin	Rabbit	500 mg	Moderate
	Eyes	Rabbit	100 mg	Moderate
Zinc bis(2-pyridylthio-1-oxide)	Eyes	Rabbit	1 mg/48H	Not reported
4-Chloro-3,5-dimethylphenol	Eyes	Rabbit	100 mg	Moderate
10,10'-Oxy-bis(phenoxyarsine)	Skin	Guinea Pig	250 mg/5D	Severe

表8. 生殖毒性データ(TCLo) (RTECSより抜粋)

Chemical	Animal	Route	Dose	Duration	Toxic effects
Methyl-N-(2-benzimidazolyl)carbamate	Rat	Inhalation	1200 $\mu\text{g}/\text{m}^3/4\text{H}$	male 72D prior to mating	Paternal Effects - Spermatogenesis (including genetic material, sperm morphology, motility, and count)
		Oral	150 mg/kg	male 1D prior to mating	Paternal Effects - Spermatogenesis (including genetic material, sperm morphology, motility, and count)
		Oral	153 mg/kg	female 8-15D of pregnancy	Effects on Fertility - Post-implantation mortality (e.g., dead and or resorbed implants per total number of implants)
					Effects on Embryo or Fetus - Fetotoxicity (except death, e.g., stunted fetus)
		Oral	4 gm/kg	male 10D prior to mating	Paternal Effects - Testes, epididymis, sperm duct
					Effects on Fertility - Male fertility index (e.g., # males impregnating females per # males exposed to fertile nonpregnant
		Oral	32.4 g/kg	male 83D and 79D prior to mating	Effects on Fertility - Mating performance (e.g., # sperm positive females per # females mated; # copulations per # estrus cycles)
					Effects on Fertility - Female fertility index (e.g., # females pregnant per # sperm positive females; # females pregnant per # females mated)
					Effects on Fertility - Pre-implantation mortality (e.g., reduction in number of implants per female; total number of implants per
		Oral	20.5 g/kg	male 83D and 79D prior to mating-1D after birth prior to mating	Effects on Fertility - Litter size (e.g., # fetuses per litter, measured before birth)
				Specific Developmental Abnormalities - Other developmental abnormalities	
	Oral	41 g/kg	male 83D and 79D prior to mating-1D after birth prior to mating	Effects on Newborn - Growth statistics (e.g., reduced weight gain)	
				Effects on Newborn - Viability index (e.g., # alive at day 4 per # born alive)	
	Oral	31200 $\mu\text{g}/\text{kg}$	female 13D of pregnancy	Effects on Newborn - Live birth index (similar to T26, except measured after birth)	
				Effects on Newborn - Growth statistics (e.g., reduced weight gain)	
	Oral	200 mg/kg	female 6-15D of pregnancy	Maternal Effects - Other effects	
				Effects on Embryo or Fetus - Extra embryonic structures (e.g., placenta, umbilical cord)	
				Effects on Embryo or Fetus - Fetotoxicity (except death, e.g., stunted fetus)	

表8. 続き(1)

Chemical	Animal	Route	Dose	Duration	Toxic effects		
Methyl-N-(2-benzimidazolyl)carbamate	Rat	Oral	350 mg/kg	female 6-15D of pregnancy	Maternal Effects - Other effects		
					Effects on Fertility - Post-implantation mortality (e.g., dead and or resorbed implants per total number of implants)		
					Effects on Embryo or Fetus - Fetotoxicity (except death, e.g., stunted fetus)		
	Oral	Oral	153 mg/kg	female 8-15D of pregnancy	Effects on Embryo or Fetus - Fetotoxicity (except death, e.g., stunted fetus)		
					Effects on Embryo or Fetus - Fetal death		
					Specific Developmental Abnormalities - Central nervous system		
	Oral	Oral	153 mg/kg	female 8-15D of pregnancy	Specific Developmental Abnormalities - Craniofacial (including nose and tongue)		
					Specific Developmental Abnormalities - Musculoskeletal system		
					Effects on Embryo or Fetus - Cytological changes (including somatic cell genetic material)		
					Paternal Effects - Spermatogenesis (including genetic material, sperm morphology, motility, and count)		
Mouse	Oral	100 mg/kg	female 10D of pregnancy	Paternal Effects - Testes, epididymis, sperm duct			
				Paternal Effects - Spermatogenesis (including genetic material, sperm morphology, motility, and count)			
				Paternal Effects - Testes, epididymis, sperm duct			
Oral	Oral	5 g/kg	male 5D prior to mating	Paternal Effects - Spermatogenesis (including genetic material, sperm morphology, motility, and count)			
				Paternal Effects - Testes, epididymis, sperm duct			
				Paternal Effects - Testes, epididymis, sperm duct			
Hamster	Oral	57 g/kg	male 60D and 46D prior to mating- 21D after birth prior to mating	Specific Developmental Abnormalities - Urogenital system			
				Oral	250 mg/kg	female 1D prior to mating	Effects on Fertility - Pre-implantation mortality (e.g., reduction in number of implants per female; total number of implants per corpora lutea)
							Oral

表8. 続き(2)

Chemical	Animal	Route	Dose	Duration	Toxic effects
2-Hydroxy-4-isopropyl-2,4,6-cycloheptatrien-1-one	Mouse	Oral	560 mg/kg	female 9D of pregnancy	Effects on Embryo or Fetus - Fetotoxicity (except death, e.g., stunted fetus) Specific Developmental Abnormalities - Craniofacial (including nose and tongue) Specific Developmental Abnormalities - Musculoskeletal system
2,4,5,6-tetrachloroisophthalonitrile	Rat	Oral	1.2 gm/kg	female 1-6D of pregnancy	Specific Developmental Abnormalities - Urogenital system
Zinc bis(2-pyridylthio-1-oxide)	Rat	Oral	150 mg/kg	female 6-15D of pregnancy	Effects on Embryo or Fetus - Fetotoxicity (except death, e.g., stunted fetus) Specific Developmental Abnormalities - Musculoskeletal system
		Skin	75 mg/kg	female 6-15D of pregnancy	Specific Developmental Abnormalities - Central nervous system
		Skin	1065 mg/kg	female 8W prior to mating and 1-15D of prior to mating pregnancy	Specific Developmental Abnormalities - Musculoskeletal system Effects on Newborn - Weaning or lactation index (e.g., # alive at weaning per # alive at day 4)
	Rabbit	Oral	65 mg/kg	female 6-18D of pregnancy	Effects on Fertility - Post-implantation mortality (e.g., dead and or resorbed implants per total number of implants) Effects on Embryo or Fetus - Fetal death
		Skin	1300 mg/kg	female 6-18D of pregnancy	Effects on Embryo or Fetus - Fetal death
4-Chloro-3,5-dimethylphenol	Rat	Oral	17100 mg/kg	female 1-19D of pregnancy	Effects on Embryo or Fetus - Fetotoxicity (except death, e.g., stunted fetus) Specific Developmental Abnormalities - Musculoskeletal system

表9. 遺伝毒性データ (RTECSより抜粋)

(A) Cytogenic effects		Chemical			
Methyl-N-(2-benzimidazolyl)carbamate	Assay	Object	Cell type	Route	Dose
	DNA inhibition	Mouse		Oral	375 mg/kg
	Mutations in microorganisms	Bacteria - S Typhimurium			333 µg/plate (-S9) 100 µg/plate (+S9)
		Mold - A Nidulans			580 nmol/l (-S9)
		Other Microorganisms			580 nmol/l (-S9)
	Cytogenetic analysis	Human	HeLa cell		100 µmol/l
		Rat	Liver	Oral	100 µmol/l
		Mouse		Oral	1 g/kg
		Hamster	Lung	Oral	500 mg/kg 100 µmol/l
	Sister chromatid exchange	Human	Lymphocyte	Oral	100 mg/kg
	Micronucleus test	Human	Lymphocyte		10 mg/l
		Rat		Oral	1 µmol/l
		Mouse		Oral	150 mg/kg
				Intraperitoneal	300 mg/kg/2D
				Oral	500 mg/kg
				Oral	200 mg/kg/24H
				Oral	500 mg/kg
			Other cell types		10 mg/l
		Hamster	Lung	Oral	316 µg/l
			Other cell types	Oral	2 g/kg/24H
				Oral	10000 ppm/3H (-S9)
				Oral	200 mg/kg
				Oral	150 mg/l
	Specific locus test	Mouse			
	Gene conversion/mitotic recombination	Yeast - S Cerevisiae			
	Sex chromosome loss/mondis junction	Human	Lymphocyte		1389 µg/l
		Mouse		Oral	500 mg/kg
		Hamster		Oral	1 g/kg
			Ovary		25 µmol/l
		Mold - A Nidulans			280 µg/l
		Yeast - S Cerevisiae			25 ppm



表9. (A) 続き

Chemical	Assay	Object	Cell type	Route	Dose
Methyl-N-(2-benzimidazolyl)carbamate	Sperm morphology Other mutation test systems	Rat Human	Leukocyte Lymphocyte	Oral	150 mg/kg 1 mg/l 20 mg/l 10 mg/l
4,4-Dimethyl-1,3-oxazolidine	Cytogenetic analysis	Hamster	Ovary		500 ng/l
N,N-dimethyl-N'-(fluorodichloromethylthio)-N''-phenylsulfamide	DNA damage DNA repair DNA inhibition	Human Bacteria - B Subtilis Human Mouse	HeLa cell HeLa cell	Oral	1500 nmol/l 1 µg/disc 1500 nmol/l 200 mg/kg
2,4,5,6-tetrachloroisophthalonitrile	Mutations in microorganisms DNA damage	Bacteria - E Coli Bacteria - S Typhimurium Human Hamster	Lymphocyte Ovary		100 µg/plate (+S9) 5 µg/plate (+S9) 50 µmol/l 200 nmol/l
4-Chloro-3,5-dimethylphenol	Mutations in mammalian somatic cells Cytogenetic analysis Sister chromatid exchange Micronucleus test Other mutation test systems	Mold - A Nidulans Mouse Hamster Hamster Other Fish Bacteria - E Coli	Lymphocyte Ovary Ovary	Unreported	800 µg/l (-S9) 120 µg/l 500 µg/l 2 mg/l 1400 ppt/7D continuous 14690 nmol/l
4-Chloro-3-methylphenol	Other mutation test systems Mutations in microorganisms Other mutation test systems	Bacteria - E Coli Bacteria - S Typhimurium Bacteria - E Coli			100 µmol/l 25 µg/plate (-S9) 100 µmol/l
2-Chloroacetamide	Mutations in microorganisms	Bacteria - E Coli			2 mmol/l (-S9)
(B) Tumorigenic effects (TDLo)					
Chemical	Animal / Route / Dose	Toxic effects			
2,4,5,6-tetrachloroisophthalonitrile	Rat / Oral / 142 g/kg/80W continuous	Tumorigenic - Carcinogenic by RTECS criteria Kidney, Ureter, and Bladder - Kidney tumors			

(B) Tumorigenic effects (TDLo)

Chemical	Animal	Route	Dose	Toxic effects
2,4,5,6-tetrachloroisophthalonitrile	Rat	Oral	142 g/kg/80W continuous	Tumorigenic - Carcinogenic by RTECS criteria Kidney, Ureter, and Bladder - Kidney tumors

表10. 他の毒性データ(TDL<sub>0</sub>)(RTECSより抜粋)

Chemical	Animal	Route	Dose	Toxic effects
2-Bromo-2-nitropropane-1,3-diol	Rat	Oral	7200 mg/kg/90D intermittent	Lung, Thorax, or Respiration - Dyspnea Gastrointestinal - Other changes
	Dog	Oral	1800 mg/kg/90D intermittent	Kidney, Ureter, and Bladder - Other changes Gastrointestinal - Nausea or vomiting
1,3-Benzisothiazolin-3-one	Mouse	Skin	10 pph/3D intermittent	Blood - Other changes Skin and Appendages - Cutaneous sensitization (experimental) Immunological Including Allergic - Increase in cellular immune response
	Rat	Oral	91250 mg/kg/2Y continuous 1440 mg/kg/90D intermittent	Liver - Changes in liver weight Lung, Thorax, or Respiration - Changes in Lung Weight Blood - Changes in serum composition (e.g., TP, bilirubin, cholesterol) Biochemical - Transaminases Endocrine - Change in GH Effects on Fertility - Pre-implantation mortality (e.g., reduction in number of implants per female; total number of implants per corpora lutea)
Methyl-N-(2-benzimidazolyl)carbamate	Rat	Oral	8000 mg/kg/8D intermittent	Nutritional and Gross Metabolic - Weight loss or decreased weight gain Endocrine - Change in gonadotropins Endocrine - Androgenic Others - Changes in testicular weight
		Oral	16600 mg/kg/83D intermittent	Paternal Effects - Spermatogenesis (including genetic material, sperm morphology, motility, and count)
		Oral	4150 mg/kg/83D intermittent	Paternal Effects - Testes, epididymis, sperm duct Endocrine - Change in GH Endocrine - Change in gonadotropins Blood - Other changes
	Hamster	Oral	400 mg/kg/85D intermittent	Brain and Coverings - Other degenerative changes Effects on Fertility - Other measures of fertility Liver - Other changes Kidney, Ureter, and Bladder - Other changes Paternal Effects - Spermatogenesis (including genetic material, sperm morphology, motility, and count)

表10. 続き(1)

Chemical	Animal	Route	Dose	Toxic effects
2-(4-Thiocyanomethylthio)benzothiazole	Rabbit	Skin	7560 mg/kg/21D intermittent	Skin and Appendages - Dermatitis, other
2,4,5,6-tetrachloroisophthalonitrile	Rat	Oral	72240 mg/kg/129W continuous	Kidney, Ureter, and Bladder - Kidney tumors
		Oral	6750 mg/kg/90D continuous	Kidney, Ureter, and Bladder - Changes in tubules (including acute renal failure, acute tubular necrosis) Kidney, Ureter, and Bladder - Changes in bladder weight
2,4,5,6-tetrachloroisophthalonitrile, 97.9%	Rat	Oral	15750 mg/kg/90D continuous	Kidney, Ureter, and Bladder - Changes in tubules (including acute renal failure, acute tubular necrosis)
Zinc bis(2-pyridylthio-1-oxide)	Rat	Oral	42 mg/kg/14D continuous	Peripheral Nerve and Sensation - Recording from peripheral motor nerve Behavioral - Muscle weakness
		Skin	300 mg/kg/15D intermittent	Nutritional and Gross Metabolic - Weight loss or decreased weight gain Peripheral Nerve and Sensation - Spastic paralysis with or without sensory change
4-Chloro-3,5-dimethylphenol	Dog	Oral	350 mg/kg/14D intermittent	Others - Death Sense Organs and Special Senses (Nose, Eye, Ear, and Taste) - Retinal changes (pigmentary depositions, retinitis, other)
	Cat	Oral	100 mg/kg/8D intermittent	Sense Organs and Special Senses (Nose, Eye, Ear, and Taste) - Other
4-Chloro-3-methylphenol	Monkey	Oral	840 mg/kg/28D intermittent	Others - Death Sense Organs and Special Senses (Nose, Eye, Ear, and Taste) - Other
		Oral	100 mg/kg/8D intermittent	Sense Organs and Special Senses (Nose, Eye, Ear, and Taste) - Other Behavioral - Somnolence (general depressed activity) Gastrointestinal - Hypermotility, diarrhea Others - Death
4-Chloro-3-methylphenol	Guinea Pig	Skin	3750 µg/kg/3D intermittent	Skin and Appendages - Dermatitis, other
4-Chloro-3-methylphenol	Rat	Oral	11200 mg/kg/28D intermittent	Nutritional and Gross Metabolic - Weight loss or decreased weight gain

表10. 続き(2)

Chemical	Animal	Route	Dose	Toxic effects
2-Chloroacetamide	Rat	Oral	1138 mg/kg/13W intermittent	Endocrine - Thyroid weight (goiter) Nutritional and Gross Metabolic - Weight loss or decreased weight gain
	Rabbit	Oral	960 mg/kg/30D intermittent	Others - Changes in testicular weight Peripheral Nerve and Sensation - Spastic paralysis with or without sensory change
		Skin	6 g/kg/30D intermittent	Cardiac - EKG changes not diagnostic of above Others - Death Blood - Changes in spleen Skin and Appendages - Dermatitis, other Nutritional and Gross Metabolic - Weight loss or decreased weight gain
Isobornyl thiocyanacetate	Rabbit	Skin	5 ml/kg/5D intermittent	Others - Death

表11. TOMES Plusから検索した各試験物質のRIITECS以外のデータ集における所在

Chemical	Abbreviation	CAS No.	HSDB	HAZARDTEXT	MEDITEXT	NJ	IRIS
2-Bromo-2-nitropropane-1,3-diol	BNPD	52-51-7					
1,2-Benzisothiazolin-3-one	BIT	2634-33-5					
N-n-Butyl-1,2-benzisothiazolin-3-one	BBIT	4299-07-4					
Methyl-N-(2-benzimidazolyl)carbamate	MBIC	10605-21-7	○	○*	○*		
4,4'-Dimethyl-1,3-oxazoline	DMO	51200-87-4					
3,4,4'-Trichlorocarbanilide	TCC	13208-22-5					
3-Iodo-2-propynylbutylcarbamate	IPBC	55406-53-6					
N-Dimethyl-N'-phenyl-N'-(fluorodichloromethylthio)sulfamide	DMPFS	1085-98-9	○				
2-(Thiocyanomethylthio)benzothiazole	TCMTBT	21564-17-0	○	○	○		
2-Hydroxy-4-isopropyl-2,4,6-cycloheptatrien-1-one	HICHO	499-44-5					
2,4,5,6-Tetrachloroisophthalonitrile	TPN	1897-45-6	○	○			
Zinc bis(2-pyridylthio-1-oxide)	ZPT	13463-41-7	○				○
2,3,5,6-Tetrachloro-4-(methylsulfonyl)pyridine	TCMSP	13108-52-6					
4-Chloro-3,5-dimethylphenol (p-Chloro-m-xyleneol)	PCMX	88-04-0					
4-Chloro-3-methylphenol (p-Chloro-m-cresol)	PCMC	59-50-7	○		○*		
N-(Fluorodichloromethylthio)phthalimide	FPI	719-96-0					
p-Chlorophenyl-3-iodopropargylformal	CPIP	29772-02-9					
1-Bromo-3-ethoxycarbonyl-1,2-diiodo-1-propene	BECDIP	77352-88-6					
4,4'-Tetramethylene-bis(4-carbamoyl-1-decylpyridinium bromide)	TMBCDPB	Unknown					
N,N'-Hexamethylenebis(4-carbamoyl-1-decylpyridinium bromide)	HMBCDPB	Unknown					
2-Chloroacetamide	CAA	79-07-2					
Isobornyl thiocanoacetate	IBTA	115-31-1	○		○*		
10,10'-Oxy-bis(phenoxyarsine)	OBPA	58-36-6	○	○	○	○	
Hiba oil	HO	Unknown					

HSDB = Hazardous Substances Data Bank.

HAZARDTEXT ® - Hazard Management

MEDITEXT ® - Medical Management

NJ = New Jersey Hazardous Substance Fact Sheets. New Jersey Department of Health and Senior Services.

IRIS = Integrated Risk Information System. United States Environmental Protection Agency.

\* その化学構造の骨格を持つ一般的な物質、代表的物質または混合物などのデータ

表 12. HSDB に分析法の記載のある抗菌剤とその分析法 (細胞毒性試験実施物質のみ)

**Methyl-N-(2-benzimidazolyl)carbamate (CAS No. 10605-21-7)**

1. EPA Method 631

matrix: municipal and industrial wastewater

procedure: high-performance liquid chromatography (HPLC); method detection limit: 8.7 µg/l.

U.S. Environmental Protection Agency. EPA Methods and Guidance for Analysis of Water. CD-ROM, Version 2.0 (ISO 9660-2, V393EPAW). Solutions Software Corp (1999)

2. Standard Method for the Examination of Water and Wastewater: Method 6610

matrix: natural ground and surface waters

procedure: HPLC

American Public Health Association, American Water Works Association, Water Environment Federation. Standard Methods for the Examination of Water and Wastewater 20th ed. (1999). CD-ROM

3. Method 8321A

matrix: wastewater, ground water, and soil/sediment matrices

procedure: HPLC/thermospray/mass spectrometry or ultraviolet detection; method detection limit: 0.4 µg/l.

U.S. Environmental Protection Agency. Solid Waste Test Methods SW-846 with Update III. CD-ROM (ISO 9660, V381SW8). Solutions Software Corp (1998)

**N-Dimethyl-N'-phenyl-N'-(fluorodichloromethylthio)sulfamide (CAS No. 1085-98-9)**

1. Tsuge S. et al.; NOYAKU KENSASHO HOKOKU (BULL AGR CHEM INSP STN) 14: 19-20 (1974).

in formulations by GLC.

2. Bezkravnaka EV. et al.; KHIM SELSK KHOZ 12: (9) 603-4 (1974)

in strawberries and grapes. Limit of Thin-layer chromatography (TLC) sensitivity is 0.02 mg/kg for euparen and 0.06 mg/kg for its metabolite.

3. Tomlin, C.D.S. (ed.). The Pesticide Manual - World Compendium. 10th ed. Surrey, UK: The British Crop Protection Council, 1994. 302

Product analysis by HPLC or by reaction with sodium methoxide and, ultimately, titration of the chloride. Residues determined by GLC.

4. FDA Method 242.1.

Organonitrogen Residues General Method for Nonfatty Foods Including Acetone Extraction and Isolation in Organic Phase. Analysis by GC/ECD.

USEPA; EMMI. Environmental Monitoring Methods Index. Version 2.0. NTIS PB-95-502415 (1995)

#### **2-(Thiocyanomethylthio)benzothiazole (CAS No. 21564-17-0)**

1. Daniels CR, Swan EP; J Chromatogr Sci 25 (1): 43-5 (1987)

on the surface of lumber

HPLC; the calibration curve is linear over the range 0.05-300 µg.

2. EMSLC Method 637

in Industrial and Municipal Wastewaters by Liquid Chromatography. Detection limit = 1000 µg/l.

USEPA; EMMI. EPA's Environmental Monitoring Methods Index. Version 1.1. PC# 4082. Rockville, MD: Government Institutes (1997)

#### **2,4,5,6-Tetrachloroisophthalonitrile (CAS No. 1897-45-6)**

1. Spencer, E. Y. Guide to the Chemicals Used in Crop Protection. 7th ed. Publication 1093.

Research Institute, Agriculture Canada, Ottawa, Canada: Information Canada, 1982. 118

Phosphorimetry

2. Stan HJ; J Chromatogr 467 (1): 85-98 (1989)

for pesticide residue analysis of 76 pesticides

The mass selective detector HP MSD; capillary column; selected ion monitoring mode;

retention time 19.16 min.

3. IARC. Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man. Geneva:



World Health Organization, International Agency for Research on Cancer, 1972-PRESENT.  
(Multivolume work).p. V30 322 (1983)

in garden fruits and vegetables surfaces

GC with electron capture detection. The minimum detection limit was 0.01 mg/kg.

3. EPA Method 606

in municipal and industrial discharges

GC with electron capture detector (ECD); detection limit 0.001 µg/l.

4. Worthing, C.R. and S.B. Walker (eds.). The Pesticide Manual - A World Compendium. 8th ed.  
Thornton Heath, UK: The British Crop Protection Council, 1987. 171

Product analysis is by gas liquid chromatography . Residues may be determined by gas liquid chromatography.

#### **Zinc bis(2-pyridylthio-1-oxide) (CAS No. 13463-41-7)**

1. Wilson CH; DETERMINATION OF PRESERVATIVES IN COSMETICS; NEWBURGER'S  
MAN COSMET ANAL 2ND ED: 105 (1977)

Two spectrophotometric methods in cosmetics

2. Clayton, G. D. and F. E. Clayton (eds.). Patty's Industrial Hygiene and Toxicology: Volume 2A,  
2B, 2C: Toxicology. 3rd ed. New York: John Wiley Sons, 1981-1982. 2740

to air samples

Ultraviolet & infrared spectrophotometry, polarography; consist of oxidizing the mercapto group  
with iodine.

ZINC OMADINE & SODIUM OMADINE TECHNICAL BULLETIN, NUMBER AD 1372-973,  
OLIN CORPORATION, STAMFORD, CONN.

3. Seymour MD, Bailey DL; Thin-layer chromatography of pyrithiones; J Chromatogr 206(2) 301  
(1981)

on silica gel GF by TLC.

4. Kabacoff BL, Fairchild CM; Determination of zinc pyrithione by chelate exchange; J Soc Cosmet  
Chem 26(9) 453 (1975)

**4-Chloro-3-methylphenol (p-Chloro-m-cresol) (CAS No. 59-50-7)**

Analytical Laboratory Methods:

1. Rhoades JW, Nulton CP; J Environ Health part A Environ Sci Eng 15 (5): 467-84 (1980)  
Pollutant volatile phenols in wastewater by microextraction
2. Sattar MA et al; J Chromatogr 136 (3): 379-84 (1977)  
TLC; separation on silicagel-dichloromethane
3. Golden JB et al; COLLOQ POLLUT PROT EAUX REG RHONE-ALPES (CR) 2ND 1: 297-301 (1975)  
in effluents/ ECD-GC; column of 10% DC 550 on chromosorb W AW 80-100.
4. Realini PA; J Chromatogr Sci 19 (3): 124-36 (1981)  
ng/l in water  
HPLC; MicroPak 5 nm C18 column; acetic acid/water/acetonitrile eluent; confirm by Dual UV detection
5. Buckman NG et al; J Chromatogr 284 (2): 441-46 (1984)  
in environmental samples, including the priority pollutants/ HPLC
6. Lee HB, Chau AS; J Assoc Off Anal Chem 66 (4): 1029-38 (1983)  
ECD-GC; detection limits using fused silica capillary columns of all chloro-, alkyl- and mononitro-phenols are between 0.5 and 5 pg.
7. Harvey HE, Chell RM; Aust J Pharm Sci 10 (Dec): 115-7 (1981)  
in injectable formulations/ HPLC, ammonium acetate:acetonitrile as the mobile phase
8. Giabbai M et al; Anal Chem Symp Ser 13 (Chromatogr Biochem, Med Environ Res): 41-52 (1983)  
in municipal wastewater & sludge samples in trace amounts  
High-resolution GC with selective detectors
9. Eichelberger JW et al; Anal Chem 55 (9): 1471-9 (1983)  
in water/ capillary column chromatography/ GC/MS methods use different pH conditions for the

liquid-liquid extractions with methylene chloride.

10. Aakerblom M, Lindgren B; J Chromatogr 258: 302-6 (1983)  
HPLC; UV (280 nm)-Electrochemical detection (ECD)

11. Armentrout DN et al; Anal Chem 51 (7): 1039-45 (1979)  
1 ppb in water/ HPLC-ECD

12. Renberg L; Chemosphere 10 (7): 767-73 (1981)  
in industrial wastewater/ GC

13. Buisson R SK et al; J Chromatogr Sci 22 (8): 339-42 (1984)  
in aqueous samples at ng/l concentration.  
Derivatization was carried out for capillary GC/electron capture detection by extractive alkylation with pentafluorobenzoyl chloride.

14. Mangani F et al; Anal Chem 58 (14): 3261-63 (1986)  
GC; column develop.

15. Method: EPA-EAD 604  
in water/ GC-Electron Capture Detector/Flame Ionization Detector; Detection Level 0.36 µg/L.  
National Environmental Methods Index; Analytical, Test and Sampling Methods. Available from  
[http://infotrek.er.usgs.gov/servlet/page?\\_pageid=202,204,1160&\\_dad=portal30&\\_schema=PORTAL\\_30](http://infotrek.er.usgs.gov/servlet/page?_pageid=202,204,1160&_dad=portal30&_schema=PORTAL_30)  
on 3-Methyl-4-chlorophenol (59-50-7) as of March 31, 2003

16. Method: EPA-NERL 528  
in drinking water/ Solid Phase Extraction and Capillary Column GC/MS; Detection Level 0.036 µg/L.

17. Method: EPA-EAD 1625  
water/ Isotope Dilution GC/MS; Detection Level 10 µg/L.

18. Method: EPA-NERL 625  
water/ GC/MS; Detection Level 3 µg/L.

19. Method: Standard Method 6410B

water/ Liquid-Liquid Extraction GC/MS; Detection Level 3 µg/L.

20. Method: Standard Method 6420B

water/ Liquid-Liquid Extraction GC Method; Detection Level: 0.36 µg/L.

21. Method: EPA-OSW 8041A

aqueous and non-aqueous samples/ Capillary GC/Flame Ionization Detector or GC/Electron Capture Detector and Single or Dual Columns

22. Method: EPA-OSW 8270D

solid waste matrices, soils, air sampling media and water samples/ GC/MS

23. Method: DOE OM100R

multimedia samples/ Capillary Column Ion Trap MS; Detection Level: 41 µg/L.

#### Clinical Laboratory Methods:

1. Lores EM et al; J Chromatogr Sci 19 (9): 466 (1981)

in human urine samples at ppb/ GC & HPLC-ECD

2. Farrington DS, Munday JW; Analyst (London) 101: 639-43 (1976)

in chicken flesh/ GC

#### **Isobornyl thiocynoacetate (CAS No. 115-31-1)**

1. Martin, H. and C.R. Worthing (eds.). Pesticide Manual. 5th ed. Worcestershire, England: British Crop Protection Council, 1977. 309

Color change

2. Association of Official Analytical Chemists. Official Methods of Analysis. 10th ed. and supplements. Washington, DC: Association of Official Analytical Chemists, 1965. New editions through 13th ed. plus supplements, 1982.p. 13/120 6.423

in livestock or fly spray/ titrimetric procedure