Table 3.A-3. Environmental fate, physical, and chemical properties of mosquito adulticides(a).

Property	Malathion				Naled				Permethrin				Resmethrin				Sumithrin				PBO			
	Temp. (°C)	Other	Value	Ref./ Note	Temp. (°C)	Other	Value	Ref./ Note	Temp. (°C)	Other	Value	Ref./ Note	Temp. (°C)	Other	Value	Ref./ Note	Temp. (°C)	Other	Value	Ref./ Note	Temp. (°C)	Other	Value	Ref./ Note
Boiling Point (°C)		0.7mmHg	156 to 157	1		0.5mmHg	110	1		0.05mmHg 0.1mmHg	200 200	1 2		0.1mmHg	180	2		760mmHg	290	2		1.0mmHg	180	2
Melting Point (°C)			2.9	1	27.5		26 26.5 to 27.5	1 2			34 to 35	2			56.5 43 to 48	1 2			2	11				
Solubility, Water (ppm)	25		130 145	1 2			ca 1.5 2000	1 2	20 20		0.006 0.2	1 2	25		0.038 insoluble	1 2	30		2	2			14.3	19
Solubility, Organic (ppm)																								
Hexane									25		>5.0E+5	1					25		1.00E+06	2				
Hexane									25		>1.0E+6	1	30		220000	2								
Methanol									25		>5.0E+5	1	30		81000	2	25		1.00E+06	2				
Xylene									25		>1.0E+6	1					25		1.00E+06	2				
Xylene									25		>5.0E+5	1												
Photolysis Half Life																								
		sandy loam soil at pH																						
Soil		6.5	173	7			c				5 to 17 days	a			30 days	12								
Shallow Water		River Water	16 hr	2											0.2 hr	2		pH = 5	9.1 - 13.9 hr	13				
		Distilled Water	42 days	2			22 days	16		Seawater	14 days	2		Distilled	20 min	10		pH = 5	5 days	14				
											19.6 to 27.1 hours, or 0.8 to													
										Pondwater	1.1 days	2		Seawater	47 min									
Surfaces		0.67 nm light	2.1 days	2							5 to 17 days	2		Sun lamp	200 min	2						95, 96-98 % remain after 7 days		2
		3.3 nm light	5.0 days	2						60% remained after 20 days		9							6 days	9				
		6.7 nm light	7.3 days	2						Insecticidally active after 26 days		9		Insecticidally active after 4-8 days		9		Insecticidally active after <2 days		9				
Air							2.4 (57.8 hours)	16																
Vapor Pressure (mPa)	25		0.45	1			26	1	25		2.90E-03	1	25		<0.01	1	20		0.16	2	25		2.6E-7 mmHg	2
Predominant Phase (Vapor, Particulate)			Vapor only	2			Vapor	2			Particulate	2			Both	2			Both	2				
	25		23.7	2	20		2.66	2	25		4.52E-02	18	30		1.46E-05	19								
Henry's Law Constant Pa m3/mol			0.00114 0.00049	1 2			6.6 0.05	1 2	20-25		0.189 0.016	1 19			<0.089 0.56	1 2			0.14	2			2.45E-04	2
Atmospheric Degration																								
Vapor Phase Half Life (days)	25		5 hr	2			2.4 days	2							25 min - 1.3 hr	2			38 min - 3 hr	2			3.4 hr.	2
Particulate Phase Half Life									25		9.9 hr	2		Loss by wet and dry deposition		2		Loss by wet and dry deposition		2		Loss by gravitational settling		2
Log10 Kow			2.7 2 to 4	1 2			1.38	2	20		6.1 6.5	1 2	25		5.42 6.1	1 2							4.29 4.75	2 21
Soil Sorbtion (Koc)			1200 151 to 183	1 15			133 180 67 to 180	1 1 2		Mean:	39300 63100	1 2			100000 50,000 to 400,000	1 2			2981 to 180000	2 2			70 399 to 830	2 21
Field (Soil) Dissipation Half Life (days)			9 (0.2-25) <1 - 6 <0.2 to 1	1 3 15			<1 <2	1 8			42 (6-106) < 28 30 - 38 17-43	1 9 12 19			30 200	1 12			4 hr to 1 day 1-2 days initially, 2-8 weeks under flooded conditions	20 11 11				
Half Life (Microbial) in Soil (days)							1	8			mean 37	19							26 days (time averaged)	20			14 days	21
Aerobic		Sndy Lm, Slt Lm loam soil in dark at	<1	1			4	1			30	1							7	14				
	22±2	pH 6.1	0.2	7																				
Anaerobic											108 32-64	1 2												
Half Life in Sediments		99% degraded in 18 days in estuary seds.		2						Sed/seawater Persistence	2.5 days 7 days	2 9												
Aqueous Hydrolysis Half Life (days)	25	pH=5	107	1,b	25	pH=5	4 0.64 (15.4	17		pH=5	stable	19	25	pH=7	1.3 yrs	2		pH = 5-7	No hydrolysis	13				
	25	pH=7	6.3	1	25	pH=7	hours)	17		pH=7	2000	2	25	pH=8	47	2		pH = 7	5.4 years	2				
	25	pH=9	0.5	1	25	pH=9	0.07 (1.6 hours)	17		pH=8	200	2	25	pH=9	4.7	2		pH=8	200	2				
	20	pH=7.4	11	2						pH=9	20	2						pH=9	20	2				
Seawater Hydrolysis Half Life (days)		pH=7.3-7.7	2	2					25	pH=9	50	1						pH=5 pH=7 pH=9	192 to 393 86 to 185 22 to 89	20 20 20				
Total Aqueous Persistence (days)		90% degraded in 14 days in river water		2			6 to 10	2																
Total Aqueous Half Life (days)		pH 5-8	6-18	4			<1	2		87-90% loss in 24 hr		9			36.5	12		aerobic	7.2	14		pH=5	stable	2
		FL retention pond	8 hr	5			<2	8										anaerobic	61.9	14		pH=7	stable	2
		Hillsborough R., FL	32 hr	5			2	12														pH=9	stable	2
		Alkaline conditions	< 2.5	7																				
Total Seawater Half Life (days)		pH=8	2.6	6							< 2.5	12												
Bioconcentration Factor (Fish/Water)			13	2			8.5	2			715 480 to 1,900	12 2		log10 = 4.45	7,748	15			418	2			1100	2

References

1. USDA, ARS, and RSML Pesticide properties Database available at http://www/arsusda.gov/rsml/ppbd.html
2. National Library of Medicine Toxicology Data Network, Hazardous Substances Data Base (HSDB) available at http://sis.nlm.nih.gov/sis/htmlgen?HSDB.htm
3. USDA 1999. Fruit Fly Cooperative Control Program: Draft Environmental Impact Statement-1999. USDA, Animal and Plant Health Inspection Service (APHIS), Riverdale, MD.
4. Paris, D.F., and D.L. Lewis. 1973. Chemical and microbial degradation of malaoxon in an Illinois soil. J. Environ. Quality 5(4):441-443. In USDA 1999.
5. USDA, Animal and Plant Health Inspection Service (APHIS). 1997. Environmental Monitoring Report: Cooperative Medfly project Florida, 1997. Riverdale, MD.
6. Horvath, L. 1982. Persistence of organophosphorus pesticides in aquatic environments. Final report for the period 1 July 1976 to 31 July 1982. International Atomic Energy Agency, Vienna, Austria. In USDA 1999.
7. USEPA. 2000. Malathion Preliminary Risk Assessment: Environmental Fate and Effects.

8. USEPA. 1999. Naled Revised Environmental Fate and Effects Assessment.
9. World Health Organization (WHO). 1990. Environmental Health Criteria 94: Permethrin. IPCS International Programme on Chemical Safety.
10. WHO. 1989. Environmental Health Criteria 92: Resmethrins—Resmethrin, Bioresmethrin, Cisresmethrin. IPCS International Programme on Chemical Safety.
11. WHO. 1990. Environmental Health Criteria 96: d-Phenothrin. IPCS International Programme on Chemical Safety.
12. EXTOXNET summaries. Available at http://ace.ace.orst.edu/enfo/extoxnet
13. ANVIL: Aerial Application Manual. No date.
14. Personnal Communication from Sid Abel, U.S. EPA, OPP. 14 September 2000.
15. Based on log Kow = 5.42 and log BCF = 0.76 log Kow - 0.23 (Lyman et al. 1982).
16. Laird, C.E. (EPA Ecological Hazard Branch, Environmental Fate and Effects Division), and S. Abel (EPA, Fate and Monitoring Branch, Environmental Fate and Effects Division). 1999. Memorandum to Dan Rosenblatt, PM Team Reviewer, Registration Division, EPA, Florida Department of Agriculture and Consumer Services request for a Section 18 for use of Naled in a bait mixture to control the oriental fruit fly in the state of Florida.
17. Peckenpaugh, J., and S. Termes (EPA, Fate and Monitoring Branch, Environmental Fate and Effects Division), and C. Laird (EPA, Ecological Hazard Branch, Environmental Fate and Effects Division). 1997. Memorandum: EFED's Reregistration Chapter C for Naled to Kathy Monk, Chief Reregistration Branch II.
18. International Agency for Research and Cancer (IARC). 1991. IARC Monograph on the Evaluation of Carcinogenic Risk to Humans 53:329-349. Lyon:IARC.
19. USEPA. Review of environmental fate and transport of synthetic pyrethroids.
20. Data submitted to USEPA in support of pesticide registration for sumithrin
21. British Crop Protection Council. The Pesticide Manual, 11th edition. C.D.S. Tomlison, ed. Surrey, UK.

Footnotes

a. Primary source is "preferred values" from reference 1. If no value there, then other sources utilized.

b. Listed as preferred value in source 1.

c. According to Reference No. 16 the major route of dissipation for naled is through aerobic soil metabolism. According to Able, S. (Fate and Effects Division, EPA). 2000. Personnal Communication With Sandra Collins, PBS&J, the half-life for irradiated soil is 0.54 hours, and for non-irradiated soil 0.58 hours.