

US EPA ARCHIVE DOCUMENT

DATA EVALUATION REPORT

1. CHEMICAL: Penncap-M
2. FORMULATION: 21.2% Methyl Parathion

Shaughnessy Number: 053501
3. CITATION: Bailey, Howard C. 1983. Chronic Toxicity of Penncap M to Daphnia magna. An unpublished report prepared by SRI International for Pennwalt Corporation. Data Acc# 250628.
4. REVIEWER: Daniel Rieder
Wildlife Biologist
EEB/HED
5. REVIEW DATE: August 16, 1983
6. TEST TYPE: Aquatic Invertebrate Chronic
 - A. Species: Daphnia magna
 - B. Material: - Penncap-M (21.2% Methyl Parathion)
- Methyl parathion as technical grade (75.1% pure)
7. RESULTS: 48-hour LC50 for Penncap-M = 5.14 ppm methyl parathion.
48-hour LC50 for methyl parathion = 724 ppm methyl parathion
MATC for Penncap-M is between 0.25 and 0.55 ppm
MATC for methyl parathion is between 0.16 and 2.51 ppm.
8. REVIEWERS CONCLUSION:

This study fulfills guideline requirements for a 21-day aquatic invertebrate study with a formulated product. It does not fulfill requirements for a chronic invertebrate study with the technical grade product (methyl parathion) because only 2 dosages were used for that test material. This study also fulfills guideline requirements for a 48-hour acute toxicity test with daphnia magna and both Penncap M (formulated product) and methyl parathion. This study shows no appreciable difference between the toxicity of the two test materials. It shows both to be moderately toxic to aquatic invertebrates.



METHODS

This study evaluated the acute and chronic toxicity of PennCap M and compared it to methyl parathion. Test temperature was 20°C and photoperiod was 16 hours light, 8 hours dark.

Acute Study

Daphnids used in the study were less than 24 hours old. Five daphnids were tested per 250 ml beaker: 4 replicates (20 organisms) per concentration. DO, pH and temperature were measured in one series for all concentrations at the beginning and end of studies.

Chronic Study

The test was performed as a static renewal bioassay with solutions being renewed on Mondays, Wednesdays and Fridays. Ten 400 ml beakers were used per concentration. Seven of the 10 beakers contained 1 daphnid apiece and were used to assess effects on growth and reproduction. The remaining three beakers each contained 5 daphnids and were used to assess effects on mortality. At time of renewal, all young were counted and discarded.

RESULTS

Acute Study

Chemical analysis and mortality data from 48-hour static tests on Penncap M and Methyl parathion with Daphnia magna.

<u>Chemical</u>	<u>Measured Concentration ppm methyl parathion</u>				<u>Number dead (N=20)</u>
	<u>Unfiltered</u>		<u>Filtered</u>		
	<u>0-hour</u>	<u>48-hour</u>	<u>0-hour</u>	<u>48-hour</u>	
Penncap M	0	0	(Control)	0	0
	1.17	0.98		0.74	0.07*
	1.87	1.87		1.18	0.80
	3.77	3.73		2.17	2.64
	6.08	6.30		4.19	3.89
	11.24	11.13		7.68	5.93
Methyl parathion	0	0	(Control)	--	--
	1.02	0.91		--	--
	2.29	1.98		--	--
	3.89	3.21		--	--
	6.50	6.87		--	--
	12.50	12.10		--	--

* Questionable value; sample lost due to improper filter.

The following LC50's are based on measured values of methyl parathion.

<u>Test Material</u>	<u>48 hour LC50 ppm</u>	<u>95% Confidence Limits</u>
Penncap M	5.14	4.38 to 6.05
Methyl parathion	7.24	6.12 to 8.73

These results show methyl parathion to be moderately toxic to daphnids.

The dissolved oxygen was above 7.9 in both tests.

Chronic Study

Mortality in 21-Day Chronic Tests on Penncap-M and Methyl Parathion with Daphnia magna.

<u>Test Material</u>	<u>Measured Concentration ppm methyl parathion</u>	<u>Mortality (n=22)</u>		
		<u>7 Days</u>	<u>14 Days</u>	<u>21 Days</u>
Penncap M	Control	0	0	0
	0.25	0	0	0
	0.55	0	0	0
	0.89	0	0	0
	1.78	0	7	16
	3.41	13	22	22
	Control	0	0	0
	0.16	0	0	0
	2.51	2	18	22

Effects of Pennicap M and Methyl Parathion on Reproduction and Growth of Daphnia magna.

Test Material	Measured Conc. ppm methyl parathion	Time (days) to first spawn	Average No. of Young Produced		Young Produced per Reproductive Day	(cm)
			Day 14	Day 21		
Pennicap M	Control	10.1	28.6	69.0	6.4	3.64
	0.25	9.3	22.7	65.9	5.7	3.48
	0.55	10.6	20.4	61.1	5.9	3.30*
	0.89	10.9	17.1*	44.3*	4.4*	3.41*
	1.78	11.0	10.0*	13.7*	4.0*	**
	<u>3.41</u>	<u>**</u>	<u>**</u>	<u>**</u>	<u>**</u>	<u>**</u>
Methyl Parathion	Control	9.7	31.7	61.9	5.6	3.53
	0.16	9.7	32.9	65.9	6.0	3.47
	<u>2.51</u>	<u>8.6</u>	<u>6.8*</u>	<u>6.8*</u>	<u>3.9*</u>	<u>**</u>

* Statistically significant, p = 0.05

**Test organisms died.

These results indicate that the maximum acceptable toxicant concentration (MATC) for methyl parathion as Pennicap M is between 0.25 and 0.55 ppm. The test using technical methyl parathion (75.1% pure) only provides supplemental data because only 2 concentrations were used and they were too far apart, to yield a good MATC.

DISCUSSION

Note that all reported concentrations were determined through chemical analysis, i.e., measured.

The purpose of these studies was to determine if Pennicap M is more toxic than methyl parathion. The acute studies suggest that Pennicap M is slightly more toxic than technical methyl parathion. Based on the chronic study, there does not seem to be an appreciable difference between the two test materials.