

Annex to RIVM report 711701 020

**Ecotoxicological Serious Risk Concentrations
for soil, sediment and (ground)water: updated
proposals for first series of compounds**

R. Posthumus and E.M.J. Verbruggen

April 2001

This investigation has been performed for the account of the Directorate-General for Environmental Protection, Ministry of Housing, Spatial Planning and the Environment, within the framework of project 711701, Risk in relation to soil quality.

Abstract

This annex is supplementary to RIVM report 711701 020, 'Ecotoxicological Serious Risk Concentrations for soil, sediment and (ground)water: updated proposals for first series of compounds' (E.M.J. Verbruggen, R. Posthumus and A.P. van Wezel). For the compounds considered in this report, which were not yet evaluated in the context of the project 'Setting Integrated Environmental Quality Standards', new toxicity data have been searched for. Further, additional toxicity data were collected for chlorophenols.

These toxicity data are incorporated in this annex. The data are single species toxicity data for terrestrial and aquatic organisms and effect data on terrestrial processes. All toxicity data on aquatic and terrestrial organisms refer to effects that may affect the species at the population level.

Contents

Legend	7
Appendix I Toxicity data on cyanides	8
Appendix II Toxicity data on non-halogenated monocyclic aromatic hydrocarbons compounds	23
Appendix III Toxicity data on halogenated aromatic hydrocarbons	45
Appendix IV Toxicity data on other compounds	87
References	87

Legend

A legend of the terms used in the tables is given below.

Aqueous toxicity test

organisms	Species used in the test, if available followed by: age, size, weight or life stage
A	Y test substance analysed in test solution N test substance not analysed in solution -: no information available
test type	S: static; R: renewal; F: flow-through
test substance purity	percentage active ingredient; ag: analytical grade; rg: reagent grade; tech.: technical grade; high: high but unknown purity
pH	pH of test water; -: no information available
hardness/salinity	hardness/salinity of test water, expressed in mg calcium carbonate per liter; -: no information available
test water	am: artificial medium; tap: tap water; nw: natural water; rw: reconstituted water
exp. time	Exposure time: h: hour(s); d: day(s); w: week(s); m: month(s); min: minute(s)
criterion	toxicological endpoint, e.g. NOEC, LC50 or EC50
notes	α : given value based on measured concentrations
value	> and $\geq$ value indicated is highest concentration used in the test. < and $\leq$ value indicated is lowest concentration used in the test.

Terrestrial species or microbial processes and enzymatic activity

species/process	Species/Process used in the test, if available followed by: age, size, weight or life stage; Species are categorized in taxonomic groups
A	Y test substance analysed in test solution N test substance not analysed in solution -: no information available
soil type	Type of soil used in test, e.g. artificial soil (art. soil).
% o.m.	percentage organic matter of test soil (if presented in % organic carbon a factor of 1.7 was used to calculate % o.m.)
% clay	percentage clay of test soil
temp.	temperature at which test was performed
exp. time	Exposure time: h: hour(s); d: day(s); w: week(s); m: month(s); min: minute(s)
criterion	toxicological endpoint, e.g. NOEC, LC50 or EC50
notes	α : given value based on measured concentrations
result test soil	results as given in the original studies; > and $\geq$ value indicated is highest concentration used in the test. < and $\leq$ value indicated is lowest concentration used in the test.
stand. soil	results from test soil recalculated to standard soil (10 % o.m. and 25% clay).

Appendix I Toxicity data on cyanides

In this appendix toxicity data on free cyanide, thiocyanate and complex cyanides are presented.

Content

<i>Table I. 1: Acute toxicity of free cyanide to fresh water species</i>	<i>9</i>
<i>Table I. 2: Acute toxicity of free cyanide to marine species</i>	<i>13</i>
<i>Table I. 3: Chronic toxicity of free cyanide to fresh water species</i>	<i>14</i>
<i>Table I. 4: Chronic toxicity of free cyanide to marine organisms</i>	<i>16</i>
<i>Table I. 5: Acute toxicity of cyanide complexes to fresh water species</i>	<i>16</i>
<i>Table I. 6: Acute toxicity of cyanide complexes to marine species</i>	<i>16</i>
<i>Table I. 7: Chronic toxicity of cyanide complexes to fresh water species</i>	<i>17</i>
<i>Table I. 8: Chronic toxicity of cyanide complexes to marine species</i>	<i>17</i>
<i>Table I. 9: Acute toxicity of thiocyanates to fresh water species</i>	<i>18</i>
<i>Table I. 10: Acute toxicity of thiocyanates to marine species</i>	<i>20</i>
<i>Table I. 11: Chronic toxicity of thiocyanates to fresh water species</i>	<i>20</i>
<i>Table I. 12: Toxicity of thiocyanates to soil organisms</i>	<i>21</i>

Table I. 1: Acute toxicity of free cyanide to fresh water species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l] *	note	reference
HYDROGEN CYANIDE											
algae											
<i>Chlamydomonas reinhardtii</i>	Y	S	ag	6.5-7.5	-	am	72 h	EC50	0.33	c	Brack & Rottler, 1994
crustacea											
<i>Acartia clausi</i>	-	-	-	-	-	-	96 h	LC50	0.030		Eisler, 1991 (review)
<i>Daphnia magna</i>	-	-	-	-	-	-	96 h	LC50	0.16		Eisler, 1991 (review)
<i>Daphnia pulex</i>	-	-	-	-	-	-	96 h	LC50	0.083		Eisler, 1991 (review)
mollusca											
<i>Physa heterostrophra</i>	-	-	-	-	-	-	96 h	LC50	0.432		Eisler, 1991 (review)
pisces											
<i>Lepomis macrochirus</i> , swim-up fry	Y	F	-	7.83	220	nw	96 h	LC50	0.23-0.37	h	Smith et al., 1978
<i>Lepomis macrochirus</i> , juveniles	Y	F	-	7.91	220	nw	96 h	LC50	0.075-0.125	i	Smith et al., 1978
<i>Oncorhynchus mykiss</i>	Y	F	-	7.34	127	tap	96 h	LC50	0.043-0.058	a	McGeachy & Leduc, 1988
<i>Oncorhynchus mykiss</i>	Y	F	-	7.34	127	tap	96 h	LC50	0.042-0.076	b	McGeachy & Leduc, 1988
<i>Oncorhynchus mykiss</i>	Y	F	-	7.9	127.7	tap	18 d	EC50	0.03	p	Ruby et al., 1979
<i>Oncorhynchus mykiss</i>	Y	F	-	8.06	-	tap	96 h	LC50	0.028	q	Kovacs & Leduc, 1982
<i>Oncorhynchus mykiss</i>	Y	F	-	8.1	-	tap	96 h	LC50	0.042	r	Kovacs & Leduc, 1982
<i>Oncorhynchus mykiss</i>	Y	F	-	7.82	-	tap	96 h	LC50	0.068	s	Kovacs & Leduc, 1982
<i>Oncorhynchus mykiss</i>	Y	F	-	7.9	127.7	tap	18 d	EC50	0.021	w	Dixon & Leduc, 1981
<i>Oncorhynchus mykiss</i> , 3-12 g	Y	F	-	7.66	220	nw	96 h	LC50	0.288		Smith et al., 1978
<i>Perca flavescens</i> , eggs	Y	F	-	7.71	220	nw	96 h	LC50	0.30		Smith et al., 1978
<i>Perca flavescens</i> , swim-up fry	Y	F	-	7.76	220	nw	96 h	LC50	0.076-0.108	j	Smith et al., 1978
<i>Perca flavescens</i> , juveniles	Y	F	-	7.86	220	nw	96 h	LC50	0.12-0.35	e	Smith et al., 1978
<i>Pimephales promelas</i> , eggs	Y	F	-	7.93	220	nw	96 h	LC50	0.082-0.12	f	Smith et al., 1978
<i>Pimephales promelas</i> , swim-up fry	Y	F	-	7.84	220	nw	96 h	LC50	0.082-0.137	g	Smith et al., 1978
<i>Pimephales promelas</i> , juveniles	-	-	-	-	-	-	96 h	LC50	0.09		Eisler, 1991 (review)
<i>Salmo salar</i>	Y	F	-	7.76	220	nw	96 h	LC50	0.108-0.518	k	Smith et al., 1978
<i>Salvelinus fontinalis</i> , sac fry											
POTASSIUM CYANIDE											
protozoa											
<i>Spirostomum ambiguum</i>	N	S	-	7.5	150	am	24 h	EC50	1.28	o	Nalecz-Jawecki & Sawicki, 1998

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]*	note	reference
<i>Tetrahymena pyriformis</i>	N	S	-	-	-	am	5 min	EC50	0.013	d	Nalecz-Jawecki & Sawicki, 1998
rotifera											
<i>Brachionus calyciflorus</i>	N	S	>97%	--	-	am	24 h	LC50	40.6		Calleja et al., 1994
crustacea											
<i>Asellus aquaticus</i>	N	S	-	-	167-190	tap	48 h	LC50	2.68		Tscheu-Schlueter & Skibba, 1986
<i>Ceriodaphnia dubia</i>	N	S	-	7.6-7.8	-	am	1 h	EC50	0.94	n	Lee et al., 1997
<i>Ceriodaphnia dubia</i>	N	S	-	7.6-7.8	-	am	48 h	EC50	2.52		Lee et al., 1997
<i>Daphnia magna</i>	N	S	>97%	--	-	am	24 h	LC50	0.26		Calleja et al., 1994
<i>Daphnia magna</i>	N	S	-	7.6-7.7	272	am	24 h	EC50	0.53		Bringmann & Kühn, 1977a
<i>Daphnia magna</i>	N	S	rg	7.6	-	am	24 h	EC50	0.61		Lilius et al., 1994
<i>Streptocephalus proboscideus</i>	N	S	>97%	--	-	am	24 h	LC50	1.4		Calleja et al., 1994
pisces											
<i>Leuciscus idus melanotus</i>	N	S	-	-	167-190	tap	96 h	LC50	0.21		Tscheu-Schlueter & Skibba, 1986
<i>Oncorhynchus mykiss</i>	N	S	-	-	24-48	tap	96 h	LC50	0.097		Tscheu-Schlueter & Skibba, 1986
<i>Perca flavescens</i>	Y	F	ag	7.8	-	nw	144 h	LC50	0.10		Solbe et al., 1985
<i>Poecilia reticulata</i>	N	S	-	-	167-186	tap	96 h	LC50	0.8		Tscheu-Schlueter & Skibba, 1986
<i>Rutilus rutilus</i>	Y	F	ag	7.8	-	nw	168 h	LC50	0.11		Solbe et al., 1985
<i>Salmo salar</i>	Y	S	-	7.5-8.5	250	nw	24 h	LC50	0.073	l	Alabaster et al., 1983
<i>Salmo salar</i>	Y	S	-	7.5-8.5	250	nw	24 h	LC50	0.024	m	Alabaster et al., 1983
SODIUM CYANIDE											
bacteria											
activated sludge bacteria	N	S	rg	7.5	-	am	3 h	EC50	5.3		Klecka & Landi, 1985
<i>Aeromonas hydrophila</i>	N	S	-	6.7	-	am	18 h	EC50	25		Dutka & Kwan, 1981
<i>Pseudomonas fluorescens</i>	N	S	-	6.7	-	am	18 h	EC50	14		Dutka & Kwan, 1981
<i>Spirillum volutans</i>	N	S	-	6.7	-	am	120 min	EC50	83		Dutka & Kwan, 1981
<i>Rhizobium meliloti</i>	N	S	-	7.5	-	am	20 min	IC50	21	x	Botsford et al., 1997
crustacea											
<i>Cyclops viridis</i>	N	S	ag	7.0	-	tap	96 h	LC50	0.32	t	Sarkar, 1990
<i>Cyclops viridis</i>	N	S	ag	7.0	-	tap	96 h	LC50	0.31	u	Sarkar, 1990
<i>Cyclops viridis</i>	N	S	ag	7.0	-	tap	96 h	LC50	0.15	v	Sarkar, 1990
<i>Daphnia</i> sp.	N	S	ag	7.0	-	tap	96 h	LC50	0.33	t	Sarkar, 1990
<i>Daphnia</i> sp.	N	S	ag	7.0	-	tap	96 h	LC50	0.32	u	Sarkar, 1990

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]*	note	reference
<i>Daphnia</i> sp.	N	S	ag	7.0	-	tap	96 h	LC50	0.15	v	Sarkar, 1990
<i>Diaptomus</i> sp.	N	S	ag	7.0	-	tap	96 h	LC50	0.31	t	Sarkar, 1990
<i>Diaptomus</i> sp.	N	S	ag	7.0	-	tap	96 h	LC50	0.33	u	Sarkar, 1990
<i>Diaptomus</i> sp.	N	S	ag	7.0	-	tap	96 h	LC50	0.15	v	Sarkar, 1990
insecta											
<i>Corixa</i> sp.	N	S	ag	7.0	-	tap	96 h	LC50	0.47	t	Sarkar, 1990
<i>Corixa</i> sp.	N	S	ag	7.0	-	tap	96 h	LC50	0.47	u	Sarkar, 1990
<i>Corixa</i> sp.	N	S	ag	7.0	-	tap	96 h	LC50	0.48	v	Sarkar, 1990
<i>Dytiscus</i> sp.	N	S	ag	7.0	-	tap	96 h	LC50	0.46	t	Sarkar, 1990
<i>Dytiscus</i> sp.	N	S	ag	7.0	-	tap	96 h	LC50	0.47	u	Sarkar, 1990
<i>Dytiscus</i> sp.	N	S	ag	7.0	-	tap	96 h	LC50	0.49	v	Sarkar, 1990
<i>Nepa</i> sp.	N	S	ag	7.0	-	tap	96 h	LC50	0.55	t	Sarkar, 1990
<i>Nepa</i> sp.	N	S	ag	7.0	-	tap	96 h	LC50	0.55	u	Sarkar, 1990
<i>Nepa</i> sp.	N	S	ag	7.0	-	tap	96 h	LC50	0.46	v	Sarkar, 1990
<i>Ranatra</i> sp.	N	S	ag	7.0	-	tap	96 h	LC50	0.43	t	Sarkar, 1990
<i>Ranatra</i> sp.	N	S	ag	7.0	-	tap	96 h	LC50	0.44	u	Sarkar, 1990
<i>Ranatra</i> sp.	N	S	ag	7.0	-	tap	96 h	LC50	0.43	v	Sarkar, 1990
mollusca											
<i>Goniobasis livescens</i>	N	S	ag	8.0-8.6	137-171	nw	48 h	LC50	760		Cairns et al., 1976
<i>Lymnaea emarginata angulata</i>	N	S	ag	8.0-8.6	137-171	nw	48 h	LC50	3.3		Cairns et al., 1976
<i>Lymnaea leuteola</i>	N	S	ag	7.0	-	tap	96 h	LC50	2.48	t	Sarkar, 1990
<i>Lymnaea leuteola</i>	N	S	ag	7.0	-	tap	96 h	LC50	2.53	u	Sarkar, 1990
<i>Lymnaea leuteola</i>	N	S	ag	7.0	-	tap	96 h	LC50	2.48	v	Sarkar, 1990
<i>Physa integra</i>	N	S	ag	8.0-8.6	137-171	nw	48 h	LC50	1.35		Cairns et al., 1976
<i>Pila globosa</i>	N	S	ag	7.0	-	tap	96 h	LC50	2.96	t	Sarkar, 1990
<i>Pila globosa</i>	N	S	ag	7.0	-	tap	96 h	LC50	2.90	u	Sarkar, 1990
<i>Pila globosa</i>	N	S	ag	7.0	-	tap	96 h	LC50	1.68	v	Sarkar, 1990
<i>Planorbis exustus</i>	N	S	ag	7.0	-	tap	96 h	LC50	2.98	t	Sarkar, 1990
<i>Planorbis exustus</i>	N	S	ag	7.0	-	tap	96 h	LC50	2.92	u	Sarkar, 1990
<i>Planorbis exustus</i>	N	S	ag	7.0	-	tap	96 h	LC50	1.64	v	Sarkar, 1990
<i>Viviparus bengalensis</i>	N	S	ag	7.0	-	tap	96 h	LC50	2.90	t	Sarkar, 1990
<i>Viviparus bengalensis</i>	N	S	ag	7.0	-	tap	96 h	LC50	2.97	u	Sarkar, 1990

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]*	note	reference
<i>Viviparus bengalensis</i>	N	S	ag	7.0	-	tap	96 h	LC50	2.89	v	Sarkar, 1990
pisces											
<i>Catla catla</i>	N	S	ag	7.0	-	tap	96 h	LC50	1.76	t	Sarkar, 1990
<i>Catla catla</i>	N	S	ag	7.0	-	tap	96 h	LC50	1.73	u	Sarkar, 1990
<i>Catla catla</i>	N	S	ag	7.0	-	tap	96 h	LC50	0.56	v	Sarkar, 1990
<i>Cirrhinus mrigalis</i>	N	S	ag	7.0	-	tap	96 h	LC50	1.52	t	Sarkar, 1990
<i>Cirrhinus mrigalis</i>	N	S	ag	7.0	-	tap	96 h	LC50	1.58	u	Sarkar, 1990
<i>Cirrhinus mrigalis</i>	N	S	ag	7.0	-	tap	96 h	LC50	0.37	v	Sarkar, 1990
<i>Labeo bata</i>	N	S	ag	7.0	-	tap	96 h	LC50	1.88	t	Sarkar, 1990
<i>Labeo bata</i>	N	S	ag	7.0	-	tap	96 h	LC50	1.97	u	Sarkar, 1990
<i>Labeo bata</i>	N	S	ag	7.0	-	tap	96 h	LC50	0.47	v	Sarkar, 1990
<i>Labeo calbasu</i>	N	S	ag	7.0	-	tap	96 h	LC50	1.98	t	Sarkar, 1990
<i>Labeo calbasu</i>	N	S	ag	7.0	-	tap	96 h	LC50	1.94	u	Sarkar, 1990
<i>Labeo calbasu</i>	N	S	ag	7.0	-	tap	96 h	LC50	0.41	v	Sarkar, 1990
<i>Labeo rohita</i>	N	S	ag	7.0	-	tap	96 h	LC50	1.95	t	Sarkar, 1990
<i>Labeo rohita</i>	N	S	ag	7.0	-	tap	96 h	LC50	1.97	u	Sarkar, 1990
<i>Labeo rohita</i>	N	S	ag	7.0	-	tap	96 h	LC50	0.38	v	Sarkar, 1990
<i>Tilapia mosambica</i>	N	S	ag	7.0	-	tap	96 h	LC50	2.01	t	Sarkar, 1990
<i>Tilapia mosambica</i>	N	S	ag	7.0	-	tap	96 h	LC50	1.97	u	Sarkar, 1990
<i>Tilapia mosambica</i>	N	S	ag	7.0	-	tap	96 h	LC50	0.37	v	Sarkar, 1990

* All values expressed as CN⁻

a responds varied between season (lowest value was found in winter) and between exercised and non-exercised fish (values lower for non-exercised fish) ; temp. 12° C

b tests performed at 12 and 18° C; lowest value was found at 12° C, highest at 18° C; non-exercised fish

c sealed bipartite vessels in which a KHCO₃/K₂CO₃ buffer to supply the algae with CO₂

d oxygen uptake rate; cited in Nalecz-Jawecki & Sawicki, 1998

e 7 tests performed at different temperatures (15.2-25 °C), dissolved oxygen (3.51-7.25 mg/l) and pH-values (7.72-8.00)

f 5 tests performed at different temperatures (15-24-9 °C), dissolved oxygen (3.77-5.14 mg/l) and pH-values (7.84-8.02)

g 10 tests performed at different temperatures (15-25.2 °C), dissolved oxygen (3.58-7.04 mg/l) and pH-values (7.70-7.98)

h 4 tests performed at different temperatures (20-24.9 °C), dissolved oxygen (3.59-6.81 mg/l) and pH-values (7.72-7.93)

i 10 tests performed at different temperatures (8.4-25.1 °C), dissolved oxygen (3.48-8.35mg/l) and pH-values (7.7-8.12)

j 6 tests performed at different temperatures (15-21.4 °C), dissolved oxygen (3.56-7.10 mg/l) and pH-values (7.69-7.83)

k 4 tests performed at different temperatures (10-13 °C), dissolved oxygen (3.50-7.84 mg/l) and pH-values (7.68-7.84)

l DO 10 mg/l; un-ionized HCN

m DO 3.5 mg/l; un-ionized HCN

n algal uptake suppression test

o deformations of the cell

p reduction in dividing spermatogonia

q 6 °C

r 12 °C

s 18 °C

t 21.5 °C

u 26.5°C

v 31.4 °C

w effect growth

x inhibition of dye reduction

Table I. 2: Acute toxicity of free cyanide to marine species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l] *	note	reference
HYDROGEN CYANIDE											
crustacea											
<i>Gammarus pseudolimnaeus</i>	-	-	-	-	-	-	96 h	LC50	0.058	b	Eisler, 1991 (review)
<i>Gammarus pseudolimnaeus</i>	-	-	-	-	-	-	96 h	LC50	0.184	c	Eisler, 1991 (review)
POTASSIUM CYANIDE											
bacteriophyta											
<i>Photobacterium phosphoreum</i>	N	S	>97%	--	-	am	5 min	EC50	4.66		Calleja et al., 1994
<i>Photobacterium phosphoreum</i>	N	S	-	-	-	am	5 min	EC50	2.5		Chang et al., 1981
crustacea											
<i>Artemia salina</i>	N	S	>97%	--	-	am	24 h	LC50	4.37		Calleja et al., 1994
<i>Mysidopsis bahia</i> , 24-h-old	N	F	-	7.8-8.2	30	nw	96 h	LC50	0.113		Lussier et al., 1985
SODIUM CYANIDE											
bacteriophyta											

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]*	note	reference
<i>Photobacterium phosphoreum</i>	N	S	-	6.7	-	am	15 min	EC50	2.8		Dutka & Kwan, 1981
algae <i>Nitzschia closterium</i>	Y	S	ag	8.0	-	nw	72 h	EC50	0.057		Pablo et al., 1997 c
mollusca <i>Chlamys asperrimus</i> , larvae	N	S	ag	-	31.6	nw	48 h	EC50	0.029	a	Pablo et al., 1997 a
crustacea <i>Penaeus monodon</i> , larvae	N	S	>97%	8	31.6	nw	96 h	LC50	0.11		Pablo et al., 1997 b

* All values expressed as CN⁻

a larval abnormality

b 20 °C

c 5.2 °C

Table I. 3: Chronic toxicity of free cyanide to fresh water species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]*	note	reference
HYDROGEN CYANIDE											
crustacea											
<i>Asellus communis</i>	-	-	-	-	-	-	11d	NOEC	0.028		Eisler, 1991 (review)
pisces											
<i>Lepomis macrochirus</i> , adults	Y	F	-	8.09	-	-	289 d	NOEC	0.0483	a	Kimball et al., 1978
<i>Lepomis macrochirus</i> , eggs	Y	F	-	8.02-8.07	-	-	57 d	NOEC	0.0088	a	Kimball et al., 1978
<i>Pimephales promelas</i>	Y	F	-	8.06-8.09	-	nw	107 d	NOEC	0.0122	d	Lind et al., 1977
<i>Pimephales promelas</i>	Y	F	-	8.06-8.09	-	nw	256	NOEC	0.0345	e	Lind et al., 1977
<i>Pimephales promelas</i>	Y	F	-	8.06-8.09	-	nw	56 d	NOEC	0.0503	f	Lind et al., 1977
<i>Salmo salar</i> , eggs	Y	F	-	7.6	-	tap	103-151 d	NOEC	< 0.01	b	Leduc, 1977
<i>Salvelinus fontinalis</i>	Y	F	-	7.9-8.1	236	nw	144 d	NOEC	0.0055	d	Koenst et al., 1977
<i>Salvelinus fontinalis</i> , eggs	Y	F	-	7.9-8.1	236	nw	12 d	NOEC	0.0519	g	Koenst et al., 1977
<i>Salvelinus fontinalis</i> , embryo	Y	F	-	7.9-8.1	236	nw	30 d	NOEC	0.0109	h	Koenst et al., 1977
<i>Salvelinus fontinalis</i> , embryo	Y	F	-	7.9-8.1	236	nw	60 d	NOEC	0.0211	h	Koenst et al., 1977
<i>Salvelinus fontinalis</i> , embryo	Y	F	-	7.9-8.1	236	nw	90 d	NOEC	0.042	a	Koenst et al., 1977

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]*	note	reference
POTASSIUM CYANIDE											
cyanophyta											
<i>Anabaena flosaquae</i>	Y	S	-	~7		am	10 d	NOEC	> 0.7		Shehata et al., 1988
<i>Microcystis aeruginosa</i>	N	S	-	7	28.7	am	8 d	NOEC	0.07		Bringmann & Kühn, 1978b
protozoa											
<i>Chilomonas paramecium</i>	N	S	-	6.9	42.3	am	48 h	NOEC	1.2		Bringmann et al., 1980
<i>Entosiphon sulcatum</i>	N	S	-	6.9	35.3	am	72 h	NOEC	1.8		Bringmann & Kühn, 1980a
bacteriophyta											
<i>Pseudomonas putida</i>	N	S	-	7	42.5	am	16 h	NOEC	0.001		Bringmann & Kühn, 1980a
algae											
<i>Ankistrodesmus falcatus</i>	N	S	-	-	19	am	10 d	NOEC	0.27	h	Tscheu-Schlueter & Skibba, 1986
<i>Scenedesmus quadricauda</i>	N	S	-	7	28.7	am	8 d	NOEC	0.03		Bringmann & Kühn, 1980a
<i>Scenedesmus quadricauda</i>	Y	S	-	7 – 10.3		am	10 d	NOEC	0.3		Shehata et al., 1988
pisces											
<i>Oncorhynchus mykiss</i> , gametes	Y	S	-	9.0	-	am	15 min	NOEC	0.00004	i	Billard & Roubaud, 1985
SODIUM CYANIDE											
protozoa											
<i>Uronema parduczi</i>	N	S	-	6.9	35.3	am	20 h	NOEC	0.27		Bringmann & Kühn, 1980b

* All values expressed as CN⁻. In cyanide solutions at 25 °C and pH 8.1, 93% of free cyanide (expressed as HCN) is in the molecular form

- a mortality
- b hatching success and larval abnormality
- c incubation time before hatch varied with temperature
- d egg production
- e hatchability
- f weight and length of the second generation
- g egg viability
- h growth
- i insemination

Table I. 4: Chronic toxicity of free cyanide to marine organisms

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l] *	note	reference
POTASSIUM CYANIDE											
crustacea											
<i>Mysidopsis bahia</i>	N	F	-	7.8-8.2	30	nw	29 d	NOEC	>0.043	a	Lussier et al., 1985
<i>Mysidopsis bahia</i>	N	F	-	7.8-8.2	30	nw	29 d	NOEC	0.043	b	Lussier et al., 1985

* All values expressed as CN⁻

a reproduction

b mortality

Table I. 5: Acute toxicity of cyanide complexes to fresh water species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l] *	note	reference
pisces											
<i>Oncorhynchus mykiss</i>	N	S	-	-	24-48	tap	96 h	LC50	0.19	a	Tscheu-Schlueter & Skibba, 1986
<i>Poecilia reticulata</i>	N	S	-	-	167-186	tap	96 h	LC50	0.9	a	Tscheu-Schlueter & Skibba, 1986

* All values expressed as CN⁻a Na₃[Cu(CN)₄]

Table I. 6: Acute toxicity of cyanide complexes to marine species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l] *	note	reference
algae											
<i>Nitzschia closterium</i>	Y	S	ag	8.0	-	nw	72 h	EC50	0.127	b	Pablo et al., 1997 c
<i>Nitzschia closterium</i>	Y	S	ag	8.0	-	nw	72 h	EC50	0.275	c	Pablo et al., 1997 c
mollusca											
<i>Chlamys asperrimus</i> , larvae	N	S	ag	-	31.6	nw	48 h	EC50 b	0.13	ab	Pablo et al., 1997a
<i>Chlamys asperrimus</i> , larvae	N	S	ag	-	31.6	nw	48 h	EC50 b	0.69	ac	Pablo et al., 1997a
crustacea											
<i>Penaeus monodon</i> , larvae	N	S	>97%	8	31.6	nw	96 h	LC50	9.1	b	Pablo et al., 1997 b

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l] *	note	reference
<i>Penaeus monodon</i> , larvae	N	S	>97%	8	31.6	nw	96 h	LC50	60.8	c	Pablo et al., 1997 b
<i>Penaeus monodon</i> , larvae	N	S	>97%	9	31.6	nw	96 h	LC50	2.70	b	Pablo et al., 1997 b
<i>Penaeus monodon</i> , larvae	N	S	>97%	9	31.6	nw	96 h	LC50	2.41	c	Pablo et al., 1997 b

* All values expressed as CN⁻

a larval abnormality

b K₃Fe(CN)₆

c K₄Fe(CN)₆

Table I. 7: Chronic toxicity of cyanide complexes to fresh water species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l] *	note	reference
algae											
<i>Ankistrodesmus falcatus</i>	N	S	-	-	19	am	10 d	NOEC	0.026	a	Tscheu-Schlueter & Skibba, 1986

* All values expressed as CN⁻

a growth; Na₃[Cu(CN)₄]

Table I. 8: Chronic toxicity of cyanide complexes to marine species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l] *	note	reference
algae											
<i>Nitzschia closterium</i>	Y	S	ag	8.0	-	nw	72 h	NOEC	0.031	a	Pablo et al., 1997 c
<i>Nitzschia closterium</i>	Y	S	ag	8.0	-	nw	72 h	NOEC	0.031	b	Pablo et al., 1997 c

* All values expressed as CN⁻

a K₃Fe(CN)₆

b K₄Fe(CN)₆

Table I. 9: Acute toxicity of thiocyanates to fresh water species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l] *	note	reference
crustacea											
<i>Daphnia magna</i>	Y	S	rg	5	75	tap	96 h	LC50	3.52	i	Watson & Maly, 1987
<i>Daphnia magna</i>	Y	S	rg	5	75	tap	96 h	LC50	1.90	b	Watson & Maly, 1987
<i>Daphnia magna</i>	Y	S	rg	5	75	tap	96 h	LC50	0.63	j	Watson & Maly, 1987
<i>Daphnia magna</i>	Y	S	rg	6	75	tap	96 h	LC50	14.57	i	Watson & Maly, 1987
<i>Daphnia magna</i>	Y	S	rg	6	75	tap	96 h	LC50	10.1	b	Watson & Maly, 1987
<i>Daphnia magna</i>	Y	S	rg	6	75	tap	96 h	LC50	1.42	j	Watson & Maly, 1987
<i>Daphnia magna</i>	Y	S	rg	7	75	tap	96 h	LC50	32.09	i	Watson & Maly, 1987
<i>Daphnia magna</i>	Y	S	rg	7	75	tap	96 h	LC50	19.32	b	Watson & Maly, 1987
<i>Daphnia magna</i>	Y	S	rg	7	75	tap	96 h	LC50	3.21	j	Watson & Maly, 1987
<i>Daphnia magna</i>	N	S	rg	-	-	-	48 h	LC50	57.4	k	Parkhurst et al., 1979
<i>Daphnia magna</i>	N	S	ag	7	1.86	tap	48 h	EC50	3.02	g	Zhang et al., 1998
pisces											
<i>Aristichthys nobilis</i>	N	S	ag	7	1.86	tap	96 h	LC50	396	g	Zhang et al., 1998
<i>Carassius auratus gibelio</i>	N	S	ag	7	1.86	tap	96 h	LC50	139	g	Zhang et al., 1998
<i>Ctenopharyngodon edellus</i>	N	S	ag	7	1.86	tap	96 h	LC50	303	g	Zhang et al., 1998
<i>Cyprinus carpio</i>	N	S	ag	7	1.86	tap	96 h	LC50	219	g	Zhang et al., 1998
<i>Hypophthalmichthys molitrix</i>	N	S	ag	7	1.86	tap	96 h	LC50	486	g	Zhang et al., 1998
<i>Oncorhynchus mykiss</i>	Y	S	rg	6	75	nw	96 h	LC50	250	a	Speyer & Raymond, 1988
<i>Oncorhynchus mykiss</i>	Y	S	rg	6	75	nw	96 h	LC50	177	b	Speyer & Raymond, 1988
<i>Oncorhynchus mykiss</i>	Y	S	rg	8	75	nw	96 h	LC50	218	a	Speyer & Raymond, 1988
<i>Oncorhynchus mykiss</i>	Y	S	rg	8	75	nw	96 h	LC50	264	b	Speyer & Raymond, 1988
<i>Oncorhynchus mykiss</i> , 1-d-old	Y	S	98%	7.45	352	nw	96 h	LC50	244	f	Kevan & Dixon, 1996
<i>Oncorhynchus mykiss</i> , 10-d-old	Y	S	98%	7.45	352	nw	96 h	LC50	191	f	Kevan & Dixon, 1996
<i>Oncorhynchus mykiss</i> , 1-d-old	Y	S	99.6%	7.75	352	nw	96 h	LC50	233	g	Kevan & Dixon, 1996
<i>Oncorhynchus mykiss</i> , 10-d-old	Y	S	99.6%	7.75	352	nw	96 h	LC50	250	g	Kevan & Dixon, 1996
<i>Oncorhynchus mykiss</i> , juvenile	Y	F	98%	7.79	353	nw	144 h	LC50	141	f	Kevan & Dixon, 1996
<i>Oncorhynchus mykiss</i> , juvenile	Y	F	99.6	7.64	353	nw	144 h	LC50	83	g	Kevan & Dixon, 1996
<i>Oncorhynchus mykiss</i> , 0.7 g	Y	F	rg	7.95	202	am	96 h	LC50	20.8		Heming et al., 1985
<i>Oncorhynchus mykiss</i> , 0.7 g	Y	F	rg	7.95	202	am	97.25 h	LC50	< 7.7	d	Heming et al., 1985

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]*	note	reference
<i>Oncorhynchus mykiss</i> , 4.1 g	Y	F	rg	8.1	152	tap	96 h	LC50	> 94		Heming & Blumhagen, 1989
<i>Oncorhynchus mykiss</i> , 4.1 g	Y	F	rg	8.1	152	tap	97 h	LC50	25	h	Heming & Blumhagen, 1989
<i>Parabramis pekinensis</i>	N	S	ag	7	1.86	tap	96 h	LC50	267	g	Zhang et al., 1998
<i>Pimephales promelas</i>	Y	S	-	7.2-7.9	40-48	tap	96 h	LC50	0.15	l	Curtis & Ward, 1981
<i>Salvelinus fontinalis</i> , 8.9 g	Y	F	rg	7.86	194	am	96 h	LC50	> 16.7		Heming et al., 1985
<i>Salvelinus fontinalis</i> , 8.9 g	Y	F	rg	7.86	194	am	96.25 h	LC50	7.8	e	Heming et al., 1985
<i>Tilapia mossambica</i>	N	S	ag	7	1.86	tap	96 h	LC50	74.5	g	Zhang et al., 1998
macrophyta											
<i>Lemna minor</i>	N	S	ag	-	-	-	96 h	EC50	3663	c	Zhang & Hongjun, 1997
amphibia											
<i>Bufo bufo gargarizans</i>	N	S	ag	7	1.86	tap	96 h	LC50	279	g	Zhang et al., 1998
<i>Rana nigromaculata</i>	N	S	ag	7	1.86	tap	96 h	LC50	230	g	Zhang et al., 1998
insecta											
<i>Chironomus</i> sp.	N	S	ag	7	1.86	tap	48 h	LC50	250	g	Zhang et al., 1998
annelida											
<i>Limnodrilus hoffmeisteri</i>	N	S	ag	7	1.86	tap	96 h	LC50	1211	g	Zhang et al., 1998

* All values expressed as SCN⁻

a temperature 5° C, KSCN was tested

b

c growth rate inhibition; NaSCN was tested

d fish were stressed for 15 sec. after 96 h exposure; mortality was measured 1.25 h later; KSCN was tested

e fish were stressed for 5 sec. after 96 h exposure; mortality was measured 0.25 h later; KSCN was tested

f KSCN was tested

g NaSCN was tested

h fish were stressed for 30 sec. after 96 h exposure; mortality was measured 1 h later; KSCN was tested

i temperature 8° C; KSCN was tested

j temperature 16° C; KSCN was tested

k tested species not given

l **mercuric** thiocyanate (**HgSCN**) was tested

Table I. 10: Acute toxicity of thiocyanates to marine species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l] *	note	reference
crustacea											
<i>Palaeomonetes pugio</i>	Y	S	-	8.3-8.7	25 o/oo	am	96 h	LC50	0.09	a	Curtis & Ward, 1981

* All values expressed as SCN⁻a **mercuric thiocyanate (HgSCN)** was tested

Table I. 11: Chronic toxicity of thiocyanates to fresh water species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
crustacea											
<i>Daphnia magna</i> , < 24 h	N	S	ag	7	1.86	tap	21 d	NOEC	0.36	il	Zhang et al., 1998
<i>Daphnia magna</i> , < 24 h	N	S	ag	7	1.86	tap	21 d	NOEC	1.43	ie	Zhang et al., 1998
pisces											
<i>Carassius auratus gibelio</i> , fry	N	F	ag	7	1.86	tap	60 d	NOEC	9.7	ie	Zhang et al., 1998
<i>Carassius auratus gibelio</i> , fry	N	F	ag	7	1.86	tap	60 d	NOEC	5.1	im	Zhang et al., 1998
<i>Oncorhynchus mykiss</i> , eggs	Y	S	98%	7.2	379	nw	3 d	NOEC	475	ehj	Kevan & Dixon, 1991
<i>Oncorhynchus mykiss</i> , eggs	Y	S	98%	7.2	379	nw	3 d	NOEC	< 85	fhj	Kevan & Dixon, 1991
<i>Oncorhynchus mykiss</i> , eggs	Y	S	98%	7.2	379	nw	3 d	NOEC	1240	ghj	Kevan & Dixon, 1991
<i>Oncorhynchus mykiss</i> , eggs	Y	S	98%	7.2	379	nw	3 d	NOEC	630	ehk	Kevan & Dixon, 1991
<i>Oncorhynchus mykiss</i> , eggs	Y	S	98%	7.2	379	nw	3 d	NOEC	< 90	fhk	Kevan & Dixon, 1991
<i>Oncorhynchus mykiss</i> , eggs	Y	S	98%	7.2	379	nw	3 d	NOEC	630	ghk	Kevan & Dixon, 1991
<i>Oncorhynchus mykiss</i> , eggs	Y	S	99.6%	7.2	379	nw	3 d	NOEC	>2700	egij	Kevan & Dixon, 1991
<i>Oncorhynchus mykiss</i> , eggs	Y	S	99.6%	7.2	379	nw	3 d	NOEC	1350	fij	Kevan & Dixon, 1991
<i>Oncorhynchus mykiss</i> , eggs	Y	S	99.6%	7.2	379	nw	3 d	NOEC	>2700	fgik	Kevan & Dixon, 1991
<i>Oncorhynchus mykiss</i> , eggs	Y	S	99.6%	7.2	379	nw	3 d	NOEC	470	eik	Kevan & Dixon, 1991
<i>Oncorhynchus mykiss</i> , juv.	Y	F	rg	7.68	382	nw	112 d	NOEC	77	e	Lanno & Dixon, 1996a,b
<i>Pimephales promelas</i>	Y	F	-	7.7-7.8	372	nw	124 d	NOEC	1.1	a	Lanno & Dixon, 1994
<i>Pimephales promelas</i>	Y	F	-	7.7-7.8	372	nw	124 d	NOEC	16.6	b	Lanno & Dixon, 1994
<i>Pimephales promelas</i>	Y	F	-	7.7-7.8	372	nw	124 d	NOEC	7.3	c	Lanno & Dixon, 1994
<i>Pimephales promelas</i>	Y	F	-	7.7-7.8	372	nw	56 d	NOEC	7.3	d	Lanno & Dixon, 1994

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l] _*	note	reference
macrophyta											
<i>Lemma minor</i>	N	S	ag	7	1.86	tap	96 h	NOEC	774	in	Zhang et al., 1998
<i>Lemma minor</i>	N	S	ag	7	1.86	tap	96 h	NOEC	1834	io	Zhang et al., 1998

* All values expressed as SCN⁻

- a time to first spawn and egg production
- b weight of F0 generation
- c mortality of F0 generation
- d survival of F1 generation at day 56
- e mortality
- f deformities
- g fertilization succes
- h KSCN was tested
- i NaSCN was tested
- j before water hardening (when perivitelline formation takes place)
- k after water hardening (when the protective chorion membrane is formed)
- l reproduction
- m weight
- n growth
- o chlorophyll A content

Table I. 12: Toxicity of thiocyanates to soil organisms

organism	soil type	pH	% om	% clay	temp [° C]	exp. time	criterion	result test soil [mg/kg _{d.w.}] _*	result stand. soil [mg/kg _{d.w.}] _*	note	reference
annelida											
<i>Limonius californicus</i>	silt loam	6.0	2.9	18.5	22	24 h	LC50	7175		a	McCaffrey et al., 1995
						24 h	LC50	6160		a	McCaffrey et al., 1995

* All values expressed in SCN⁻

- a exposure to KSCN; soil contained 17 g total carbon per kg; mortality is after 48 h and 96 h recovery respectively.

Appendix II Toxicity data on non-halogenated monocyclic aromatic hydrocarbons compounds

In this appendix toxicity data on non-halogenated monocyclic aromatic hydrocarbons compounds are presented.

Content

<i>Table II. 1: Acute toxicity of phenol to fresh water species</i>	24
<i>Table II. 2: Acute toxicity of phenol to marine species</i>	29
<i>Table II. 3: Chronic toxicity of phenol to fresh water species</i>	30
<i>Table II. 4: Chronic toxicity of phenol to marine species</i>	31
<i>Table II. 5: Toxicity of phenol to soil organisms</i>	31
<i>Table II. 6: Acute toxicity of o-cresol to fresh water species</i>	32
<i>Table II. 7: Acute toxicity of o-cresol to marine species</i>	33
<i>Table II. 8: Chronic toxicity of o-cresol to fresh water species</i>	34
<i>Table II. 9: Toxicity of o-cresol to soil organisms</i>	34
<i>Table II. 10: Acute toxicity of m-cresol to fresh water species</i>	35
<i>Table II. 11: Acute toxicity of m-cresol to marine species</i>	35
<i>Table II. 12: Chronic toxicity of m-cresol to fresh water species</i>	36
<i>Table II. 13: Toxicity of m-cresol to soil organisms</i>	36
<i>Table II. 14: Acute toxicity of p-cresol to fresh water species</i>	37
<i>Table II. 15: Acute toxicity of p-cresol to marine species</i>	38
<i>Table II. 16: Chronic toxicity p-cresol to fresh water species</i>	38
<i>Table II. 17: Acute toxicity of catechol to fresh water species</i>	38
<i>Table II. 18: Acute toxicity of catechol to marine species</i>	39
<i>Table II. 19: Toxicity of catechol to soil organisms</i>	39
<i>Table II. 20: Acute toxicity of resorcinol to fresh water species</i>	39
<i>Table II. 21: Acute toxicity of resorcinol to marine species</i>	40
<i>Table II. 22: Chronic toxicity of resorcinol to fresh water species</i>	40
<i>Table II. 23: Acute toxicity of hydroquinone to fresh water species</i>	41
<i>Table II. 24: Acute toxicity of hydroquinone to marine species</i>	42
<i>Table II. 25: Chronic toxicity of hydroquinone to fresh water species</i>	43
<i>Table II. 26: Toxicity of hydroquinone to soil organisms</i>	44

Table II. 1: Acute toxicity of phenol to fresh water species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
protozoa											
<i>Tetrahymena pyriformis</i>	-	S	>95%	7.35	-	am	48 h	EC50	153		Bryant & Schultz, 1994
<i>Tetrahymena pyriformis</i>	-	S	-	-	-	am	48 h	EC50	254		Schultz et al., 1986
<i>Tetrahymena pyriformis</i>	-	S	-	-	-	am	48 h	EC50	196		Baerden & Schultz, 1997
bacteriophyta											
Activated sludge bacteria-	-	S	-	7.5	-	am	6 h	IC50	799	c	Klecka & Landi, 1985
<i>Aeromonas hydrophila</i>	-	S	-	6.7	-	am	18 h	EC50	1600	d	Dutka & Kwan, 1981
<i>Bacillus</i> sp.	-	S	-	7	-	am	30 min	EC50	2300	f	Liu et al., 1982
<i>Rhizobium meliloti</i>	-	S	-	7.5	-	am	20 min	EC50	1433	j	Botsford et al., 1997
<i>Escherichia coli</i>	-	S	-	-	-	am	12-16 h	EC50	659	d	Nendza & Seydel, 1988
<i>Pseudomonas fluorescens</i>	-	S	-	6.7	-	am	18 h	EC50	880		Dutka & Kwan, 1981
<i>Pseudomonas fluorescens</i>	-	S	≥99%	7.2	-	dtw	20 min	EC50	458		Boyd et al., 1997
<i>Pseudomonas putida</i>	-	S	-	-	-	am	6 h	EC50	244	d	Slabbert, 1986
<i>Spirillum volutans</i>	-	S	-	6.7	-	am	120 min	EC50	300		Dutka & Kwan, 1981
algae											
<i>Chlorella vulgaris</i>	N	S	rg	7.5	-	am	96 h	EC50	370		Shigeoka et al., 1988
<i>Pseudokirchneriella subspicata</i>	N	S	rg	7.5	-	am	96 h	EC50	150		Shigeoka et al., 1988
<i>Scenedesmus quadricauda</i>	N	S	ag	8.4	127	nw	24 h	EC50	403		Tisler & Zagorc-Koncan, 1997
rotifera											
<i>Brachionus calyciflorus</i>	N	S	ag	-	-	am	24 h	LC50	112		Crisinel et al., 1994
crustacea											
<i>Acanthodiaptomus denticornis</i> , 3.2 mm	-	R	-	7.6	-	-	48 h	LC50	38		Alekseyev & Antipin, 1974
<i>Acanthodiaptomus denticornis</i> , 1.7 mm	-	R	-	7.6	-	-	48 h	LC50	110		Alekseyev & Antipin, 1974
<i>Asellus aquaticus</i>	Y	F	-	7.8	99.5	-	96 h	LC50	180		Green et al., 1985
<i>Asellus aquaticus</i> , 8.2 mm	-	R	-	7.6	-	-	48 h	LC50	15		Alekseyev & Antipin, 1974
<i>Asellus aquaticus</i> , juv. 4 mm	-	R	-	7.6	-	-	48 h	LC50	78		Alekseyev & Antipin, 1974
<i>Asellus intermedius</i> , 0.012 g	-	S	-	7.4	130	-	96 h	LC50	25		Ewell et al., 1986
<i>Bythotrephes longimanus</i> , 3 mm	-	R	-	7.6	-	-	48 h	LC50	126		Alekseyev & Antipin, 1974
<i>Ceriodaphnia dubia</i>	N	S	>99%	8.18	57.07	rtw	48 h	LC50	3.1		Oris et al., 1991
<i>Ceriodaphnia dubia</i>	-	S	-	8.2	90-110	nw	48 h	LC50	20		Cowgill & Milazzo, 1991

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
<i>Canthocamptus</i> spp.	N	S	-	-	-	-	48 h	LC50	8.8		Rama Rao & Nath, 1983
<i>Chaetocorophium</i> c.f. <i>lucasi</i>	N	S	-	7.6	10	nw	96 h	EC50	8.1		Hickey & Martin, 1995
<i>Cyclops vicinus</i> , 1.6 mm	-	R	-	7.6	-	-	48 h	LC50	114		Alekseyev & Antipin, 1974
<i>Cypris pubera</i> , 2.1 mm	-	R	-	7.6	-	-	48 h	LC50	132		Alekseyev & Antipin, 1974
<i>Cypris subglobosa</i> , 0.67 mm	-	S	rg	7.9	204	dtw	96 h	LC50	72		Rao et al., 1983
<i>Daphnia longispina</i> , 2.5 mm	-	R	-	7.6	-	-	48 h	LC50	14		Alekseyev & Antipin, 1974
<i>Daphnia magna</i> , < 24 h	-	S	rg	7.6	-	am	24 h	EC50	9.1		Lilius et al., 1994
<i>Daphnia magna</i> , < 12 h	-	S	-	8.2	160-180	nw	48 h	LC50	13		Cowgill & Milazzo, 1991
<i>Daphnia magna</i> , < 24 h	-	S	-	8.0	157	nw	48 h	LC50	12.9		Gersich et al., 1986
<i>Daphnia magna</i> , < 24 h	-	S	-	-	100	-	48 h	LC50	23		Hermens et al., 1984
<i>Daphnia magna</i> , < 24 h	-	F	-	7.4	44.7	-	48 h	LC50	12.6		Holcombe et al., 1987
<i>Daphnia magna</i> , 1 st -2 nd instar	-	S	-	7.4	130	-	96 h	LC50	4		Ewell et al., 1986
<i>Daphnia magna</i> , < 24 h	-	S	-	7.8	140	-	48 h	LC50	20		Millemann et al., 1984
<i>Daphnia magna</i> , < 24 h	-	S	-	7.0-8.2	154.5	-	48 h	LC50	23.5		Randall & Knopp, 1980
<i>Daphnia magna</i>	N	S	ag	7.8	250	am	48 h	EC50	5.6		Crisinel et al., 1994
<i>Daphnia magna</i> , 12-24 h	-	S	-	-	-	nw	48 h	EC50	6.6		Keen & Baillod, 1985
<i>Daphnia magna</i> , 6-24 h	N	S	-	8.0	240	am	24 h	EC50	21		Kühn et al., 1989
<i>Daphnia magna</i> , 6-24 h	N	S	-	8.0	240	am	48 h	EC50	10		Kühn et al., 1989
<i>Daphnia magna</i> , 24 h	N	S	-	7.6	272	am	24 h	LC50	31		Bringmann & Kühn, 1977a
<i>Daphnia magna</i> , 24 h	N	S	-	8	250	am	24 h	LC50	12		Bringmann & Kühn, 1982
<i>Daphnia magna</i> , < 72 h	-	S	>95%	8	200	rw	24 h	EC50	37.2		Devillers et al., 1987
<i>Daphnia magna</i> , =< 24 h	-	S	≥80%	7.4-9.4	160-186	rnw	48 h	LC50	12		LeBlanc, 1980
<i>Daphnia magna</i>	-	S	rg	-	-	-	48 h	LC50	30		Parkhurst et al., 1979
<i>Daphnia pulex</i>	N	S	ag	8.4	127	nw	48 h	EC50	25		Tisler & Zagorc-Koncan, 1997
<i>Daphnia pulex</i>	-	R	-	7.6	-	-	48 h	LC50	18		Alekseyev & Antipin, 1974
<i>Daphnia pulicaria</i>	Y	F	-	8.1	707.3	nw	48 h	LC50	> 109		DeGraeve et al., 1980
<i>Eudiaptomus gracilis</i> , 1.8 mm	-	R	-	7.6	-	-	48 h	LC50	130		Alekseyev & Antipin, 1974
<i>Gammarus fasciatus</i>	-	-	-	-	-	-	48 h	LC50	7-35		Stephenson, 1983 (cited)
<i>Gammarus fasciatus</i> , 0.007 g	-	S	-	7.4	130	-	96 h	LC50	21		Ewell et al., 1986
<i>Gammarus minus</i>	-	S	-	7.8	140	nw	48 h	LC50	37		Millemann et al., 1984
<i>Gammarus pulex</i>	S	S	-	8.3	249	dtw	96 h	LC50	51		Stephenson, 1983
<i>Gammarus pulex</i>	Y	S	-	8.3	104	dtw	96 h	LC50	40		Stephenson, 1983

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
<i>Gammarus pulex</i>	Y	F	-	7.8	99.5	-	96 h	LC50	69		Green et al., 1985
<i>Lynceus brachyuris</i> , 4 mm	-	R	-	7.6	-	-	48 h	LC50	78		Alekseyev & Antipin, 1974
<i>Polypheumus pediculus</i> , 1.4 mm	-	R	-	7.6	-	-	48 h	LC50	57		Alekseyev & Antipin, 1974
<i>Streptocephalus rubricaudatus</i> , cyst	N	S	ag	-	-	am	24 h	LC50	36.3		Crisinel et al., 1994
<i>Streptocephalus texanus</i> , cyst	N	S	ag	-	-	am	24 h	LC50	21.9		Crisinel et al., 1994
insecta											
<i>Baetis rhodani</i>	Y	F	-	7.8	99.5	-	96 h	LC50	16		Green et al., 1985
<i>Chironomus riparius</i>	Y	S	-	7.8	99.5	-	96 h	LC50	240		Green et al., 1985
<i>Chironomus tentans</i> , 4 th instar	-	S	-	7.8	150	-	48 h	LC50	187		Franco et al., 1984
<i>Chironomus tentans</i> , 4 th instar	-	S	-	7.8	140	-	48 h	LC50	105		Millemann et al., 1984
<i>Clinotanytus pinguis</i> , 3 rd -4 th instar	-	S	-	7.8	150	-	48 h	LC50	81		Franco et al., 1984
<i>Einfeldia natchitchoeae</i> , 3 rd -4 th instar	-	S	-	7.8	150	-	48 h	LC50	70		Franco et al., 1984
<i>Hydropsyche angustipennis</i>	Y	S	-	7.8	99.5	-	96 h	LC50	250		Green et al., 1985
<i>Tanytus neopunctipennis</i> , 3 rd -4 th instar	-	S	-	7.8	150	-	48 h	LC50	70		Franco et al., 1984
mollusca											
<i>Anodonta complunata</i> , 42 mm	-	R	-	7.6	-	-	48 h	LC50	500		Alekseyev & Antipin, 1974
<i>Bitithynia tentaculata</i> , 8.2 mm	-	R	-	7.6	-	-	48 h	LC50	580		Alekseyev & Antipin, 1974
<i>Dreissenia polymorpha</i> , 10.4 mm	-	R	-	7.6	-	-	48 h	LC50	180		Alekseyev & Antipin, 1974
<i>Goniobasis livescens</i>	-	S	-	8.0-8.6	137-171	nw	48 h	LC50	320		Cairns et al., 1976
<i>Indoplanorbis exustus</i>	-	S	-	-	-	nw	96 h	LC50	126		Agrawal, 1987
<i>Lymnaea acuminata</i>	-	S	-	7.9	210	nw	96 h	LC50	129		Gupta & Rao, 1982
<i>Lymnaea stagnalis</i>	-	R	-	7.6	-	-	48 h	LC50	350		Alekseyev & Antipin, 1974
<i>Physa fontinalis</i> , 6.4 mm	-	R	-	7.6	-	-	48 h	LC50	320		Alekseyev & Antipin, 1974
<i>Physa fontinalis</i> , 2.9 mm	-	R	-	7.6	-	-	48 h	LC50	260		Alekseyev & Antipin, 1974
<i>Physa gyrina</i> , 7.5 mm	-	R	-	7.6	-	-	48 h	LC50	260		Millemann et al., 1984
<i>Physa integra</i>	-	S	-	7.8	140	-	48 h	LC50	260		Cairns et al., 1976
<i>Planorbis planorbis</i> , 6.0 mm	-	S	-	8.0-8.6	137-171	nw	48 h	LC50	107		Alekseyev & Antipin, 1974
<i>Planorbis vortex</i> , 4.4 mm	-	R	-	7.6	-	-	48 h	LC50	520		Alekseyev & Antipin, 1974
<i>Radix ovata</i> , juv., 3.5 mm	-	R	-	7.6	-	-	48 h	LC50	370		Alekseyev & Antipin, 1974
<i>Sphaerium corneum</i> , 10 mm	-	R	-	7.6	-	-	48 h	LC50	330		Alekseyev & Antipin, 1974
<i>Spheerium novaezelandiae</i>	-	R	-	7.4	-	-	48 h	LC50	780		Alekseyev & Antipin, 1974
<i>Viviparus viviparus</i> , 30.7 mm	N	S	-	7.6	10	nw	96 h	EC50	11.9		Hickey & Martin, 1995
	-	R	-	7.6	-	-	48 h	LC50	420		Alekseyev & Antipin, 1974

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
annelida											
<i>Dugesia tigrina</i> , 0.006 g	-	S	-	7.4	130	-	96 h	LC50	32		Ewell et al., 1986
<i>Lumbriculus variegatus</i>	N	S	-	7.6	10	nw	96 h	EC50	35.6		Hickey & Martin, 1995
<i>Limnodrilus hoffmeisteri</i>	Y	S	-	7.8	99.5	-	96 h	LC50	780		Green et al., 1985
<i>Polycelis felina</i>	Y	S	-	7.8	99.5	-	96 h	LC50	88		Green et al., 1985
pisces											
<i>Brachydanio rerio</i>	Y	S	-	-	64	-	96 h	LC50	25		Razani et al., 1986
<i>Brachydanio rerio</i>	N	F	-	8.0	170	dtw	48 h	LC50	60		Slooff, 1979
<i>Brachydanio rerio</i>	N	S	-	7.5	-	-	96 h	LC50	27.8		Wellens, 1982
<i>Brachydanio rerio</i>	Y	F	rg	8.0-8.3	350-375	nw	96 h	LC50	29		Fogels & Sprague, 1977
<i>Campostoma anomalum</i> , 47.5 mm	N	S	-	7.8	45	rdw	48 h	LC50	17.9		Chagnon & Hlohowskyj, 1989
<i>Catostomus commersoni</i> , 2.4 g	Y	F	-	7.2	41-48	nw	96 h	LC50	10.6		Holcombe et al., 1987
<i>Colisa fasciatus</i>	-	S	tech	6.8-7.6	66	tw	96 h	LC50	32.7		Verma et al., 1980
<i>Jordanella floridae</i>	Y	F	rg	8.0-8.3	350-375	nw	96 h	LC50	36.3		Fogels & Sprague, 1977
<i>Leuciscus idus melanotus</i>	N	S	-	7-8	255	tap	48 h	LC50	14, 25		Juhnke & Lüdemann, 1978
<i>Lebistes reticulatus</i> , 0.09 g	N	S	-	7.9	228	-	96 h	LC50	47.5		Gupta et al., 1982
<i>Lepomis macrochirus</i> , 1.1 g	Y	F	-	7.2	41-48	nw	96 h	LC50	17.4		Holcombe et al., 1987
<i>Notopterus notopterus</i>	-	S	tech	6.8-7.6	66	tw	96 h	LC50	12.5		Verma et al., 1980
<i>Oncorhynchus mykiss</i> , 13.1 g	Y	F	-	7.2	41-48	nw	96 h	LC50	10.5		Holcombe et al., 1987
<i>Oncorhynchus mykiss</i> , 6.1 g	Y	F	-	8.1	707.3	nw	96 h	LC50	8.9		DeGraeve et al., 1980
<i>Oncorhynchus mykiss</i>	Y	F	rg	7.9	135	dtw	96 h	LC50	9.7	α	Hodson et al., 1984
<i>Oncorhynchus mykiss</i>	N	S	ag	8.4	127	nw	48 h	LC50	13.1		Tisler & Zagorc-Koncan, 1997
<i>Oncorhynchus mykiss</i>	Y	F	rg	8.0-8.3	350-375	nw	96 h	LC50	11.6		Fogels & Sprague, 1977
<i>Pimephales promelas</i> , 1.1 g	Y	F	-	8.1	707.3	nw	96 h	LC50	67.5	a	DeGraeve et al., 1980
<i>Pimephales promelas</i> , 1.4 g	Y	F	-	8.1	707.3	nw	96 h	LC50	24.9	b	DeGraeve et al., 1980
<i>Pimephales promelas</i> , 5g	-	R	-	-	-	-	48 h	LC50	44	e	Zhao & Wang, 1993
<i>Pimephales promelas</i>	N	F	-	-	-	-	96 h	LC50	37		Schultz et al., 1986
<i>Pimephales promelas</i> , 30-35 d	N	F	-	7.9	96-125	nw	96 h	LC50	29	b	Hall & Kier, 1984; Hall et al., 1984
<i>Pimephales promelas</i>	N	S	rg	7.8	140	nw	96 h	LC50	31.5	g	Mayes et al., 1983
<i>Pimephales promelas</i>	N	S	-	7.2	41-48	nw	96 h	LC50	25.6		Millemann et al., 1984
<i>Pimephales promelas</i> , 0.3 g	Y	F	-	7.2	41-48	nw	96 h	LC50	25.3		Holcombe et al., 1987
<i>Poecilia reticulata</i>	N	S	-	-	-	-	96 h	LC50	43		Shigeoka et al., 1988

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
<i>Poecilia reticulata</i>	-	S	-	7.8	-	-	96 h	LC50	31		Könemann & Musch, 1981
<i>Poecilia reticulata</i>	-	S	-	7.3	-	-	96 h	LC50	30		Könemann & Musch, 1981
<i>Poecilia reticulata</i>	-	S	-	6.1	-	-	96 h	LC50	37		Könemann & Musch, 1981
<i>Rasbora heteromorpha</i> , 1.3-3 cm	N	F	100	7.2	20	nw	48 h	LC50	7.4		Alabaster, 1969
<i>Rasbora heteromorpha</i> , 1.3-3 cm	N	F	100	7.2	250	nw	48 h	LC50	6.8		Alabaster, 1969
<i>Rutilus rutilus</i>	-	F	ag	7.8	257-260	nw	48 h	LC50	10		Solbé et al., 1985
<i>Saccobranchius fossiliss</i>	-	S	tech	6.8-7.6	66	tw	96 h	LC50	39.4		Verma et al., 1980
macrophyta											
<i>Elodea canadensis</i>	-	S	-	-	-	tap	9 d	EC50	235	h	Stom & Roth, 1981
<i>Lemna gibba</i>	-	S	-	4.8	636	am	7d	EC50	226-22	i	Cowgill et al., 1991
<i>Lemna minor</i>	-	S	-	4.8	636	am	7 d	EC50	223-312	i	Cowgill et al., 1991
<i>Lemna minor</i>	-	S	-	-	-	tap	12 d	EC50	169	h	Stom & Roth, 1981

a temperature 14 °C

b temperature 25 °C

c respiration inhibition

d bacterial growth inhibition

e calculated by QSAR

f dehydrogenase activity

g geometric mean of 96 h LC50 values found for fry, juvenile and subadults

h growth

i results for number of plants, number of fronds and dry weight

j dye reduction

Table II. 2: Acute toxicity of phenol to marine species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
bacteriophyta											
13 bacterial strains	-	S	ag	-	-	am	16 h	EC50	1300		Warne et al., 1989
<i>Vibrio fischeri</i>	-	S	-	-	-	am	15 min	EC50	21.6		Zhao & Wang, 1993
<i>Vibrio fischeri</i>	-	S	-	-	-	rw	5 min	EC50	25		Bulich et al., 1981
<i>Vibrio fischeri</i>	-	S	-	-	-	am	15 min	EC50	34.2		Ribo & Kaiser, 1983
<i>Vibrio fischeri</i>	N	S	ag	-	-	am	15 min	EC50	28.2		Crisinel et al., 1994
<i>Vibrio fischeri</i>	-	S	-	6.7	-	am	15 min	EC50	34		Dutka & Kwan, 1981
algae											
<i>Skeletonema costatum</i>	N	S	rg	8.2	-	am	120 h	EC50	50		Cowgill et al., 1989
echinodermata											
<i>Strongylocentrotus droebachiensis</i> , eggs	Y	S	99.5%	-	-	nw	96 h	EC50	> 30	c	Falk-Petersen et al., 1985
annelida											
<i>Ophryotrocha diadema</i>	N	S	-	-	32	nw	48 h	LC50	100-330		Parker, 1984
<i>Platynereis dumerilii</i> , embryos, < 6h	N	S	> 90%	-	35	nw	48 h	EC50	122	a	Palau-Casellas & Hutchinson, 1998
<i>Platynereis dumerilii</i> , 7-d-old larvae	N	S	> 90%	-	35	nw	96 h	LC50	75.7		Palau-Casellas & Hutchinson, 1998
crustacea											
<i>Artemia salina</i> , cysts	N	S	ag	-	35	nw	24 h	LC50	28.2		Crisinel et al., 1994
<i>Artemia salina</i> , newly hatched	-	S	-	-	-	am	48 h	LC50	56		Price et al., 1974
<i>Crangon septemspinosa</i> , 2.4-4.5 g	N	S	-	-	30	nw	21 h	LC50	7.5		McLeese et al., 1979
<i>Gammarus duebeni</i>	Y	F	-	7.7	6	nw	96 h	LC50	76, 27	b	Oksama & Kristofferson, 1979
<i>Mesidotea entomon</i>	Y	F	-	7.7	6	nw	96 h	LC50	79		Oksama & Kristofferson, 1979
<i>Panopeus herbstii</i>	-	S	-	-	25	-	96 h	LC50	52.8		Key & Scott, 1986
pisces											
<i>Gadus morhua</i> , 1-d-old embryos	Y	S	99.5%	-	-	nw	96 h	EC50	> 30	c	Falk-Petersen et al., 1985
<i>Phoxinus phoxinus</i>	Y	F	-	7.7	6	nw	96 h	LC50	9.5		Oksama & Kristofferson, 1979

a normal embryo-larval development

b temperatures 5 and 16 °C, respectively

c development

Table II. 3: Chronic toxicity of phenol to fresh water species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
protozoa											
<i>Chilomonas paramecium</i>	N	S	-	6.9	142	am	48 h	NOEC	65		Bringmann et al., 1980
<i>Entosiphon sulcatum</i>	N	S	-	6.9	142	am	72 h	NOEC	33		Bringmann, 1978
<i>Uronema parduczi</i>	N	S	-	6.9	142	am	20 h	NOEC	144		Bringmann & Kühn, 1980b
bacteriophyta											
<i>Pseudomonas putida</i>	N	S	-	7.0	60	am	16 h	NOEC	64		Bringmann & Kühn, 1976
mixed culture	N	S	ag	8.4	127	nw	120 h	NOEC	283		Tisler & Zagore-Koncan, 1997
cyanophyta											
<i>Microcystis aeruginosa</i>	N	S	-	7.0	60	am	8 d	NOEC	4.6		Bringmann & Kühn, 1978a,b
algae											
<i>Scenedesmus quadricauda</i>	N	S	-	7.0	-	am	8 d	NOEC	7.5		Bringmann & Kühn, 1977b
crustacea											
<i>Ceriodaphnia dubia</i>	N	S	>99%	8.18	57.07	rtw	7 d	NOEC	2.5	e	Oris et al., 1991
<i>Ceriodaphnia dubia</i>	-	S	-	8.2	90-110	nw	10 d	NOEC	0.84	b	Cowgill & Milazzo, 1991
<i>Ceriodaphnia dubia</i>	-	S	-	8.2	90-110	nw	10 d	NOEC	6.5	fgh	Cowgill & Milazzo, 1991
<i>Daphnia magna</i>	N	R	-	8.2	199	-	16 d	NOEC	0.16	c	Deneer et al., 1988a,b
<i>Daphnia magna</i> , < 12 h	-	S	-	8.2	160-180	nw	12 d	NOEC	0.5	c	Cowgill & Milazzo, 1991
<i>Daphnia magna</i> , < 12 h	-	S	-	8.2	160-180	nw	12 d	NOEC	1.4	f	Cowgill & Milazzo, 1991
<i>Daphnia magna</i> , < 12 h	-	S	-	8.2	160-180	nw	12 d	NOEC	0.8	g	Cowgill & Milazzo, 1991
<i>Daphnia magna</i> , < 12 h	-	S	-	8.2	160-180	nw	12 d	NOEC	3.9	h	Cowgill & Milazzo, 1991
pisces											
<i>Brachydanio rerio</i>	Y	S	-	6.3	57-61	dtw	3 m	NOEC	4.9	b	Razani et al., 1986
<i>Brachydanio rerio</i> , eggs	Y	S	-	6.3	57-61	dtw	2 m	NOEC	2.2	cd	Razani et al., 1986
<i>Oncorhynchus mykiss</i> , eggs	Y	F	-	7.8	579.9	nw	58 d	NOEC	0.1	ci	DeGraeve et al., 1980
<i>Pimephales promelas</i> , eggs	Y	F	-	8.0	725.3	nw	30 d	NOEC	33.2	a	DeGraeve et al., 1980
<i>Pimephales promelas</i> , eggs	Y	F	-	8.0	725.3	nw	30 d	NOEC	0.75	c	DeGraeve et al., 1980

a hatchability

b survival

c growth

d eggs from adults exposed to the same concentrations of phenol

e reproduction (NOEC=MATC/2)

- f total progeny
- g number of broods
- h mean brood size
- i estimated by authors from LOEC of 0.2 mg/l and dose-response curves for *P. promelas* and *O. mykiss*.

Table II. 4: Chronic toxicity of phenol to marine species

organism	A	test type	test subst.	purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
algae <i>Skeletonema costatum</i>	N	S	rg		8.2	-	am	120 h	NOEC	13		Cowgill et al., 1989

Table II. 5: Toxicity of phenol to soil organisms

organism	soil type	pH	% om	% clay	temp [° C]	exp. time	criterion	result test soil [mg/kg _{d.w.}]	result stand. soil [mg/kg _{d.w.}]	note	reference
macrophyta											
<i>Lactuca sativa</i>	OECD	7.5	1.6	-	23	14 d	NOEC	32 a	160	a	Adema & Henzen, 1989
<i>Lactuca sativa</i>	OECD	7.5	1.6	-	23	7 d	NOEC	32 a	160	a	Adema & Henzen, 1989
<i>Lactuca sativa</i>	OECD	7.8	1.4	12	20	14 d	EC50	79 a	395	a	Hulzebos et al., 1993

a growth

Table II. 6: Acute toxicity of o-cresol to fresh water species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
protozoa											
<i>Tetrahymena pyriformis</i>	-	S	-	-	-	am	48 h	EC50	213		Cronin & Schultz, 1996
insecta											
<i>Chironomus gr. thummi</i>	N	S	>98%	8.2	200	am	48 h	LC50	34		Slooff, 1983
<i>Cloëon dipterum</i>	N	S	>98%	8.2	200	am	48 h	LC50	50		Slooff, 1983
<i>Corixa punctata</i>	N	S	>98%	8.2	200	am	48 h	LC50	80		Slooff, 1983
<i>Ischnura elegans</i>	N	S	>98%	8.2	200	am	48 h	LC50	46		Slooff, 1983
<i>Nemoura cinerea</i>	N	S	>98%	8.2	200	am	48 h	LC50	10		Slooff, 1983
coelenterata											
<i>Hydra oligactis</i>	N	S	>98%	8.2	200	am	48 h	LC50	75		Slooff, 1983
annelida											
<i>Dugesia cf. lugubris</i>	N	S	>98%	8.2	200	am	48 h	LC50	24		Slooff, 1983
<i>Erpobdella octoculata</i>	N	S	>98%	8.2	200	am	48 h	LC50	135		Slooff, 1983
Tubificidae	N	S	>98%	8.2	200	am	48 h	LC50	165		Slooff, 1983
mollusca											
<i>Lymnaea stagnalis</i>	N	S	>98%	8.2	200	am	48 h	LC50	160		Slooff, 1983
crustacea											
<i>Asellus aquaticus</i>	N	S	>98%	8.2	200	am	48 h	LC50	23		Slooff, 1983
<i>Daphnia cucullata</i> , 11 d	N	S	>=98%	7.9	100	am	48 h	LC50	16.4		Canton & Adema, 1978
<i>Daphnia magna</i> , < 1 d	N	S	>=98%	7.9	100	am	48 h	LC50	9.2	a	Canton & Adema, 1978
<i>Daphnia magna</i> , < 1 d	N	S	>=98%	7.9	100	am	48 h	LC50	23.5	a	Canton & Adema, 1978
<i>Daphnia magna</i> , < 1 d	N	S	>=98%	7.9	100	am	48 h	LC50	14.5	a	Canton & Adema, 1978
<i>Daphnia magna</i> , 24 h	N	S	-	7.6	272	am	24 h	LC50	19		Bringmann & Kühn, 1977a
<i>Daphnia magna</i> , < 72 h	N	S	> 95%	8	200	rw	24 h	EC50	17.9		Devillers et al., 1987
<i>Daphnia magna</i>	-	S	rg	-	-	-	48 h	LC50	5		Parkhurst et al., 1979
<i>Daphnia pulex</i> , < 1 d	N	S	>+98%	7.9	100	am	48 h	LC50	9.6		Canton & Adema, 1978
<i>Daphnia pulicaria</i>	Y	F	-	8.1	707.3	nw	48 h	LC50	> 94		DeGraeve et al., 1980
<i>Gammarus pulex</i>	N	S	>98%	8.2	200	am	48 h	LC50	21		Slooff, 1983
pisces											
<i>Brachydanio rerio</i>	N	S	-	7.5	-	-	96 h	LC50	24		Wellens, 1982

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
<i>Carassius auratus</i> , 1-2 g	N	S	-	7.5	20	nw	96 h	LC50	23.3		Pickering & Henderson, 1966
<i>Lepomis macrochirus</i> , 1-2 g	N	S	-	7.5	20	nw	96 h	LC50	20.8		Pickering & Henderson, 1966
<i>Oncorhynchus mykiss</i> , 5.1 g	Y	F	-	8.1	707.3	nw	96 h	LC50	8.4		DeGraeve et al., 1980
<i>Pimephales promelas</i> , 1.5 g	Y	F	-	8.1	707.3	nw	96 h	LC50	18.2		DeGraeve et al., 1980
<i>Pimephales promelas</i> , 1-2 g	N	S	-	7.5	20	nw	96 h	LC50	12.6		Pickering & Henderson, 1966
<i>Pimephales promelas</i> , 1-2 g	N	S	-	8.2	360	nw	96 h	LC50	13.4		Pickering & Henderson, 1966
<i>Pimephales promelas</i>	N	S	-	7.7	47	-	96 h	LC50	14		Geiger et al., 1990
<i>Poecilia reticulata</i> , 0.1-0.2 g	N	S	-	7.5	20	nw	96 h	LC50	18.9		Pickering & Henderson, 1966
amphibia											
<i>Ambystoma mexicanum</i> , 3-4 w after hatching	-	S	-	8.2	200	DSW	48 h	LC50	40		Slooff & Baerselman, 1980
<i>Xenopus laevis</i> , 3-4 w after hatching	-	S	-	8.2	200	DSW	48 h	LC50	38		Slooff & Baerselman, 1980

a 3 different experiments performed in 2 different laboratories

Table II. 7: Acute toxicity of o-cresol to marine species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
bacteriophyta											
<i>Vibrio fischeri</i>	-	S	-	-	-	am	15 min	EC50	19		Zhao & Wang, 1993
<i>Vibrio fischeri</i>	-	S	-	-	-	am	5 min	EC50	11		Chang et al., 1981
<i>Vibrio fischeri</i>	N	S	-	-	-	am	15 min	EC50	25.9		Cronin & Schultz, 1997
crustacea											
<i>Elasmopus pecteniscus</i>	N	S	-	-	30	am	96 h	LC50	10.2		Lee & Nicol, 1978
echinodermata											
<i>Strongylocentrotus droebachiensis</i> , eggs	Y	S	98%	-	-	nw	96 h	EC50	30	a	Falk-Petersen et al., 1985
pisces											
<i>Gadus morhua</i> , 1-d-old embryos	Y	S	98%	-	-	nw	96 h	EC50	12	a	Falk-Petersen et al., 1985

a development

Table II. 8: Chronic toxicity of o-cresol to fresh water species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
protozoa											
<i>Chilomonas paramecium</i>	N	S	-	6.9	142	am	48 h	NOEC	132		Bringmann et al., 1980
<i>Entosiphon sulcatum</i>	N	S	-	6.9	142	am	72 h	NOEC	17		Bringmann, 1978
<i>Uronema parduczi</i>	N	S	-	6.9	142	am	20 h	NOEC	31		Bringmann & Kühn, 1980b
bacteriophyta											
<i>Pseudomonas putida</i>	N	S	-	7.0	60	am	16 h	NOEC	33		Bringmann & Kühn, 1976
cyanophyta											
<i>Microcystis aeruginosa</i>	N	S	-	7.0	60	am	8 d	NOEC	6.8		Bringmann & Kühn, 1978a,b
algae											
<i>Chlorella pyrenoidosa</i>	N	S	>98%	8.2	200	am	48 h	NOEC	34		Slooff et al., 1983
<i>Scenedesmus pannonicus</i>	N	S	-	8.2	200	am	48 h	NOEC	36		Slooff et al., 1983
<i>Scenedesmus quadricauda</i>	N	S	-	7.0	-	am	8 d	NOEC	11		Bringmann & Kühn, 1977b
<i>Selenastrum capricornutum</i>	N	S	>98%	8.2	200	am	96 h	NOEC	65		Slooff et al., 1983

Table II. 9: Toxicity of o-cresol to soil organisms

organism	soil type	pH	% om	% clay	temp [° C]	exp. time	criterion	result test soil [mg/kg _{d.w.}]	result stand. soil [mg/kg _{d.w.}]	note	reference
macrophyta											
<i>Lactuca sativa</i>	OECD	7.5	1.6	-	23	14d	NOEC	32	160	a	Adema & Henzen, 1989
<i>Lactuca sativa</i>	OECD	7.5	1.6	-	23	7 d	NOEC	10	50	a	Adema & Henzen, 1989
<i>Lactuca sativa</i>	OECD	7.8	1.4	12	20	14 d	EC50	> 100	> 500	a	Hulzebos et al., 1993

a growth

Table II. 10: Acute toxicity of m-cresol to fresh water species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
protozoa											
<i>Tetrahymena pyriformis</i>	-	S	-	-	-	am	48 h	EC50	125		Cronin & Schultz, 1996
crustacea											
<i>Daphnia magna</i> , 24 h	N	S	-	8	250	am	24 h	LC50	25		Bringmann & Kühn, 1982
<i>Daphnia magna</i> , 24 h	N	S	-	7.6	272	am	24 h	LC50	8.9		Bringmann & Kühn, 1977a
<i>Daphnia magna</i> , < 72 h	-	S	> 95%	8	200	rw	24 h	EC50	19.2		Devillers et al., 1987
<i>Daphnia magna</i>	-	S	rg	-	-	-	48 h	LC50	18.8		Parkhurst et al., 1979
<i>Daphnia pulicaria</i>	Y	F	-	8.1	707.3	nw	48 h	LC50	> 99.5		DeGraeve et al., 1980
pisces											
<i>Brachydanio rerio</i>	N	S	-	7.5	-	-	96 h	LC50	15.9		Wellens, 1982
<i>Leuciscus idus melanotus</i>	N	S	-	7-8	255	tap	48 h	LC50	18		Juhnke & Lüdemann, 1978
<i>Oncorhynchus mykiss</i> , 6.0 g	Y	F	-	8.1	707.3	nw	96 h	LC50	8.9		DeGraeve et al., 1980
<i>Pimephales promelas</i> , 1.6 g	Y	F	-	8.1	707.3	nw	96 h	LC50	55.9		DeGraeve et al., 1980

Table II. 11: Acute toxicity of m-cresol to marine species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
bacteriophyta											
<i>Vibrio fischeri</i>	N	S	-	-	-	am	15 min	EC50	7.5		Cronin & Schultz, 1997
echinodermata											
<i>Strongylocentrotus droebachiensis</i> , eggs	Y	S	98%	-	-	nw	96 h	EC50	30	a	Falk-Petersen et al., 1985
pisces											
<i>Gadus morhua</i> , 1-d-old embryos	Y	S	98%	-	-	nw	96 h	EC50	> 30	a	Falk-Petersen et al., 1985

a: development

Table II. 12: Chronic toxicity of *m-cresol* to fresh water species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
protozoa											
<i>Chilomonas paramecium</i>	N	S	-	6.9	142	am	48 h	NOEC	114		Bringmann et al., 1980
<i>Entosiphon sulcatum</i>	N	S	-	6.9	142	am	72 h	NOEC	31		Bringmann, 1978
<i>Uronema parduczi</i>	N	S	-	6.9	142	am	20 h	NOEC	62		Bringmann & Kühn, 1980b
bacteriophyta											
<i>Pseudomonas putida</i>	N	S	-	7.0	60	am	16 h	NOEC	53		Bringmann & Kühn, 1976
cyanophyta											
<i>Microcystis aeruginosa</i>	N	S	-	7.0	60	am	8 d	NOEC	13		Bringmann & Kühn, 1978a,b
algae											
<i>Scenedesmus quadricauda</i>	N	S	-	7.0	-	am	8 d	NOEC	15		Bringmann & Kühn, 1977b

Table II. 13: Toxicity of *m-cresol* to soil organisms

organism	soil type	pH	% om	% clay	temp [° C]	exp. time	criterion	result test soil [mg/kg _{d.w.}]	result stand. soil [mg/kg _{d.w.}]	note	reference
macrophyta											
<i>Lactuca sativa</i>	OECD	7.5	1.6	-	23	14 d	NOEC	3.2	16	a	Adema & Henzen, 1989
<i>Lactuca sativa</i>	OECD	7.5	1.6	-	23	7 d	NOEC	3.2	16	a	Adema & Henzen, 1989
<i>Lactuca sativa</i>	OECD	7.8	1.4	12	20	14 d	EC50	96	480	a	Hulzebos et al., 1993

a growth

Table II. 14: Acute toxicity of *p-cresol* to fresh water species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
protozoa											
<i>Tetrahymena pyriformis</i>	-	S	>95%	7.35	-	am	48 h	EC50	69		Schultz et al., 1986, 1987
<i>Tetrahymena pyriformis</i>	-	S	-	-	-	am	48 h	EC50	165		Cronin & Schultz, 1996
bacteriophyta											
<i>Escherichia coli</i>	-	S	-	-	-	am	12-16 h	EC50	411		Nendza & Seydel, 1988
algae											
<i>Scenedesmus subspicatus</i>	N	S	-	8.0	54	am	48 h	EC50	7.8		Kühn & Pattard, 1990
crustacea											
<i>Daphnia magna</i> , 24 h	Y	R	-	8.0	48	am	24 h	EC50	4.9		Kühn et al., 1989
<i>Daphnia magna</i> , 6-24 h	N	S	-	8.0	240	am	24 h	EC50	14		Kühn et al., 1989
<i>Daphnia magna</i> , 6-24 h	N	S	-	8.0	240	am	48 h	EC50	7.7		Kühn et al., 1989
<i>Daphnia magna</i> , < 72 h	-	S	> 95%	8	200	rw	24 h	EC50	12.5		Devillers et al., 1987
<i>Daphnia magna</i>	-	S	rg	-	-	-	48 h	LC50	1.4		Parkhurst et al., 1979
<i>Daphnia pulicaria</i>	Y	F	-	8.1	707.3	nw	48 h	LC50	22.7		DeGraeve et al., 1980
pisces											
<i>Oncorhynchus mykiss</i>	Y	F	rg	-	-	dtw	96 h	LC50	7.5	α	Hodson et al., 1984
<i>Oncorhynchus mykiss</i> , 4.4 g	Y	F	-	8.1	707.3	nw	96 h	LC50	7.9		DeGraeve et al., 1980
<i>Pimephales promelas</i>	-	F	-	-	-	nw	96 h	LC50	16		Baerden & Schultz, 1997
<i>Pimephales promelas</i> , 2.0 g	Y	F	-	8.1	707.3	nw	96 h	LC50	28.6		DeGraeve et al., 1980

Table II. 15: Acute toxicity of *p*-cresol to marine species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
bacteriophyta											
<i>Vibrio fischeri</i>	N	S	-	-	-	rw	5 min	EC50	1.5		Bulich et al., 1981
<i>Vibrio fischeri</i>	-	S	-	-	-	am	15 min	EC50	2.3		Ribo & Kaiser, 1983
<i>Vibrio fischeri</i>	N	S	-	-	-	am	15 min	EC50	2.3		Cronin & Schultz, 1997
<i>Rhizobium meliloti</i>	-	S	-	7.5	-	am	20 min	EC50	74		Botsford et al., 1997
echinodermata											
<i>Strongylocentrotus droebachiensis</i> , eggs	Y	S	98%	-	-	nw	96 h	EC50	5	a	Falk-Petersen et al., 1985
pisces											
<i>Gadus morhua</i> , 1-d-old embryos	Y	S	98%	-	-	nw	96 h	EC50	5	a	Falk-Petersen et al., 1985

a development

Table II. 16: Chronic toxicity *p*-cresol to fresh water species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
crustacea											
<i>Daphnia magna</i> , 24 h	Y	R	-	8.0	48	am	21 d	NOEC	1.0		Kühn et al., 1989

Table II. 17: Acute toxicity of catechol to fresh water species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
bacteriophyta											
<i>Pseudomonas fluorescens</i>	-	S	≥99%	7.2	-	dtw	20 min	EC50	0.77		Boyd et al., 1997
<i>Rhizobium meliloti</i>	-	S	-	7.5	-	am	20 min	EC50	4		Botsford et al., 1997
protozoa											
<i>Tetrahymena pyriformis</i>	-	S	>95%	7.35	-	am	48 h	EC50	19.5		Bryant & Schultz, 1994
pisces											
<i>Oncorhynchus mykiss</i> , 8.9 g	Y	F	-	8.1	707.3	nw	96 h	LC50	8.9		DeGraeve et al., 1980
<i>Pimephales promelas</i> , 0.9 g	Y	F	-	8.1	707.3	nw	96 h	LC50	3.5		DeGraeve et al., 1980

Table II. 18: Acute toxicity of catechol to marine species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
bacteriophyta											
<i>Vibrio fisheri</i>	-	S	-	-	-	am	15 min?	EC50	32		Boyd et al., 1997

Table II. 19: Toxicity of catechol to soil organisms

organism	soil type	pH	% om	% clay	temp [° C]	exp. time	criterion	result test soil [mg/kg _{d.w.}]	result stand. soil [mg/kg _{d.w.}]	note	reference
macrophyta											
<i>Lactuca sativa</i>	OECD	7.8	1.4	12	20	14 d	EC50	> 1000	> 5000	a	Hulzebos et al., 1993

a growth

Table II. 20: Acute toxicity of resorcinol to fresh water species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
crustacea											
<i>Daphnia magna</i> , < 72 h	-	S	> 95%	8	200	rw	24 h	EC50	108		Devillers et al., 1987
<i>Daphnia pulicaria</i>	Y	F	-	8.1	707.3	nw	48 h	LC50	> 100		DeGraeve et al., 1980
pisces											
<i>Oncorhynchus mykiss</i>	Y	F	-	8.1	707.3	nw	96 h	LC50	> 100	a	DeGraeve et al., 1980
<i>Pimephales promelas</i> , 1.4 g	Y	F	-	8.1	707.3	nw	96 h	LC50	100		DeGraeve et al., 1980
<i>Pimephales promelas</i>	Y	R	-	7.2-7.9	40-48	rtw	96 h	LC50	60		Curtis & Ward, 1981
macrophyta											
<i>Elodea canadensis</i>	-	S	-	-	-	tap	9 d	EC50	143	b	Stom & Roth, 1981
<i>Lemna minor</i>	-	S	-	-	-	tap	12 d	EC50	165	b	Stom & Roth, 1981

a 20% mortality at 100 mg/l

b growth

Table II. 21: Acute toxicity of resorcinol to marine species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
bacteriophyta											
<i>Vibrio fischeri</i>	-	S	-	-	-	am	15 min	EC50	110		Zhao & Wang, 1993
crustacea											
<i>Palaemonetes pugio</i>	Y	R	-	8.3-8.7	25	am	96 h	LC50	42		Curtis & Ward, 1981

Table II. 22: Chronic toxicity of resorcinol to fresh water species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
pisces											
<i>Brachydanio rerio</i> , eggs	N	S	≥99%	8.4	250	rw	7 d	NOEC	100	a	Van Leeuwen et al., 1990
<i>Brachydanio rerio</i> , eggs	N	S	≥99%	8.4	250	rw	7 d	NOEC	32	b	Van Leeuwen et al., 1990
<i>Oncorhynchus mykiss</i> , eggs	N	S	≥99%	7.7	50	rw	60 d	NOEC	100	ab	Van Leeuwen et al., 1990
<i>Oncorhynchus mykiss</i> , eggs	N	S	≥99%	7.7	50	rw	60 d	NOEC	1	c	Van Leeuwen et al., 1990

a mortality

b total embryotoxicity (lethality and malformations)

c weight

Table II. 23: Acute toxicity of hydroquinone to fresh water species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
protozoa											
<i>Colpidium campylum</i>	-	S	-	-	-	-	24 h	EC50	73.3		Devillers et al., 1990
<i>Tetrahymena pyriformis</i>	-	S	>95%	7.35	-	am	48 h	EC50	37.1		Bryant & Schultz, 1994
rotifera											
<i>Brachionus calyciflorus</i>	N	S	ag	-	-	am	24 h	LC50	0.24		Crisinel et al., 1994
bacteriophyta											
<i>Beneckea harveyi</i>	-	S	-	7.5	-	am	10 sec	EC50	82.6	b	Devillers et al., 1990 (cited)
<i>Beneckea harveyi</i>	-	S	-	7.5	-	am	1 h	EC50	110	c	Devillers et al., 1990 (cited)
<i>Escherichia coli</i>	-	S	-	-	-	-	6-8 hr	EC50	34		Devillers et al., 1990
<i>Escherichia coli</i>	-	S	-	-	-	am	12-16 h	EC50	34		Nendza & Seydel, 1988
mycophyta											
<i>Candida albicans</i>	-	S	-	-	-	-	24 h	EC50	3750		Devillers et al., 1990
<i>Saccharomyces cerevisiae</i>	-	S	-	-	-	-	24 h	EC50	2750		Devillers et al., 1990
<i>Torulopsis glabrata</i>	-	S	-	-	-	-	24 h	EC50	1000		Devillers et al., 1990
algae											
<i>Cryptocodinium cohnii</i>	-	S	-	-	-	-	40 h	LC50	50		Devillers et al., 1990
<i>Prorocentrum micans</i>	-	S	-	-	-	-	2 h	EC50	0.3		Devillers et al., 1990
<i>Selenastrum capricornutum</i>	-	S	-	-	-	-	72 h	EC50	0.34		Devillers et al., 1990
crustacea											
<i>Daphnia magna</i> , 6-24 h	N	S	-	8.0	240	am	24 h	EC50	0.32		Kühn et al., 1989
<i>Daphnia magna</i> , 6-24 h	N	S	-	8.0	240	am	48 h	EC50	0.29		Kühn et al., 1989
<i>Daphnia magna</i> , 24 h	N	S	-	7.6	272	am	24 h	LC50	0.09		Bringmann & Kühn, 1977a
<i>Daphnia magna</i> , 24 h	N	S	-	8	250	am	24 h	EC50	0.12		Bringmann & Kühn, 1982
<i>Daphnia magna</i> , < 72 h	-	S	> 95%	8	200	rw	24 h	EC50	0.14		Devillers et al., 1987
<i>Daphnia magna</i>	N	S	ag	7.8	250	am	48 h	EC50	0.13		Crisinel et al., 1994
<i>Daphnia pulicaria</i>	N	F	-	8.1	707.3	nw	48 h	LC50	0.162		DeGraeve et al., 1980
<i>Sireptocephalus rubricaudatus</i> , cyst	N	S	ag	-	-	am	24 h	LC50	0.07		Crisinel et al., 1994
<i>Sireptocephalus texanus</i> , cyst	N	S	ag	-	-	am	24 h	LC50	0.10		Crisinel et al., 1994
pisces											
<i>Brachydanio rerio</i>	N	S	-	7.5	-	-	96 h	LC50	0.17		Wellens, 1982

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
<i>Leuciscus idus melanotus</i>	N	S	-	7-8	255	tap	48 h	LC50	0.15		Juhnke & Lüdemann, 1978
<i>Oncorhynchus mykiss</i> , 16.8 g	N	F	-	8.1	707.3	nw	96 h	LC50	0.097		DeGraeve et al., 1980
<i>Oncorhynchus mykiss</i>	Y	F	rg	-	-	dtw	96 h	LC50	0.64	α	Hodson et al., 1984
<i>Pimephales promelas</i> , 0.5 g	N	F	-	8.1	707.3	nw	96 h	LC50	0.044		DeGraeve et al., 1980
macrophyta											
<i>Elodea canadensis</i>	-	S	-	-	-	tap	9 d	EC50	43	a	Stom & Roth, 1981
<i>Lemna minor</i>	-	S	-	-	-	tap	12 d	EC50	7.7	a	Stom & Roth, 1981

a growth

b luminescence

c dehydrogenase activity

Table II. 24: Acute toxicity of hydroquinone to marine species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
bacteriophyta											
<i>Vibrio fischeri</i>	N	S	ag	-	-	am	15 min	EC50	0.31		Crisinel et al., 1994
<i>Vibrio fischeri</i>	-	S	-	-	-	am	15 min	EC50	0.038		Ribo & Kaiser, 1983
<i>Vibrio fischeri</i>	-	S	-	-	-	am	30 min	EC50	0.072		Devillers et al., 1990
crustacea											
<i>Artemia salina</i> , cysts	N	S	ag	-	35	mw	24 h	LC50	30.7		Crisinel et al., 1994
<i>Artemia salina</i>	-	S	-	-	-	-	24 h	LC50	20.7		Devillers et al., 1990

Table II. 25: Chronic toxicity of hydroquinone to fresh water species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
protozoa											
<i>Chilomonas paramecium</i>	N	S	-	6.9	142	am	48 h	NOEC	22		Bringmann et al., 1980
<i>Entosiphon sulcatum</i>	N	S	-	6.9	142	am	72 h	NOEC	11		Bringmann, 1978
<i>Uronema parduczi</i>	N	S	-	6.9	142	am	20 h	NOEC	21		Bringmann & Kühn, 1980b
bacteriophyta											
<i>Pseudomonas putida</i>	N	S	-	7.0	60	am	16 h	NOEC	58		Bringmann & Kühn, 1976
cyanophyta											
<i>Microcystis aeruginosa</i>	N	S	-	7.0	60	am	8 d	NOEC	1.1		Bringmann & Kühn, 1978a,b
algae											
<i>Scenedesmus quadricauda</i>	N	S	-	7.0	-	am	8 d	NOEC	0.93		Bringmann & Kühn, 1977b

Table II. 26: Toxicity of hydroquinone to soil organisms

organism	soil type	pH	% om	% clay	temp [° C]	exp. time	criterion	result test soil [mg/kg _{d.w.}]	result stand. soil [mg/kg _{d.w.}]	note	reference
macrophyta											
<i>Hordeum vulgare</i>	clay loam	6.9	4.6	28	20	7 d	NOEC	> 2500	> 5435	a	Bremner & Krogmeier, 1990
<i>Hordeum vulgare</i>	clay loam	7.5	5.6	30	20	7 d	NOEC	> 2500	> 4464	a	Bremner & Krogmeier, 1990
<i>Hordeum vulgare</i>	silty clay	7.7	11.2	42	20	7 d	NOEC	> 2500	> 2232	a	Bremner & Krogmeier, 1990
<i>Medicago sativa</i>	clay loam	6.9	4.6	28	20	7 d	NOEC	> 2500	> 5435	a	Bremner & Krogmeier, 1990
<i>Medicago sativa</i>	clay loam	7.5	5.6	30	20	7 d	NOEC	> 2500	> 4464	a	Bremner & Krogmeier, 1990
<i>Medicago sativa</i>	silty clay	7.7	11.2	42	20	7 d	NOEC	> 2500	> 2232	a	Bremner & Krogmeier, 1990
<i>Sorghum bicolor</i>	clay loam	6.9	4.6	28	20	7 d	NOEC	> 2500	> 5435	a	Bremner & Krogmeier, 1990
<i>Sorghum bicolor</i>	clay loam	7.5	5.6	30	20	7 d	NOEC	> 2500	> 4464	a	Bremner & Krogmeier, 1990
<i>Sorghum bicolor</i>	silty clay	7.7	11.2	42	20	7 d	NOEC	> 2500	> 2232	a	Bremner & Krogmeier, 1990
<i>Triticum aestivum</i>	clay loam	6.9	4.6	28	20	7 d	NOEC	500	1087	a	Bremner & Krogmeier, 1990
<i>Triticum aestivum</i>	clay loam	7.5	5.6	30	20	7 d	NOEC	500	893	a	Bremner & Krogmeier, 1990
<i>Triticum aestivum</i>	silty clay	7.7	11.2	42	20	7 d	NOEC	500	446	a	Bremner & Krogmeier, 1990
<i>Zea mays</i>	clay loam	6.9	4.6	28	20	7 d	NOEC	> 2500	> 5435	a	Bremner & Krogmeier, 1990
<i>Zea mays</i>	clay loam	7.5	5.6	30	20	7 d	NOEC	500	893	a	Bremner & Krogmeier, 1990
<i>Zea mays</i>	silty clay	7.7	11.2	42	20	7 d	NOEC	> 2500	> 2232	a	Bremner & Krogmeier, 1990

a seed germination

Appendix III Toxicity data on halogenated aromatic hydrocarbons

In this appendix toxicity data on halogenated aromatic hydrocarbons are presented.

Content

<i>Table III. 1: Acute toxicity of 2-chlorophenol to fresh water species</i>	47
<i>Table III. 2: Acute toxicity of 2-chlorophenol to marine species</i>	48
<i>Table III. 3: Chronic toxicity of 2-chlorophenol to fresh water species</i>	48
<i>Table III. 4: Toxicity of 2-chlorophenol to soil organisms</i>	49
<i>Table III. 5: Acute toxicity of 3-chlorophenol to fresh water species</i>	49
<i>Table III. 6: Acute toxicity of 3-chlorophenol to marine species</i>	50
<i>Table III. 7: Toxicity of 3-chlorophenol to soil organisms</i>	50
<i>Table III. 8: Acute toxicity of 4-chlorophenol to fresh water species</i>	51
<i>Table III. 9: Acute toxicity of 4-chlorophenol to marine species</i>	52
<i>Table III. 10: Chronic toxicity of 4-chlorophenol to fresh water species</i>	53
<i>Table III. 11: Chronic toxicity of 4-chlorophenol to marine species</i>	53
<i>Table III. 12: Acute toxicity of 2,3-dichlorophenol to fresh water species</i>	54
<i>Table III. 13: Acute toxicity of 2,3-chlorophenol to marine species</i>	54
<i>Table III. 14: Acute toxicity of 2,4-dichlorophenol to fresh water species</i>	55
<i>Table III. 15: Acute toxicity of 2,4-dichlorophenol to marine species</i>	56
<i>Table III. 16: Chronic toxicity of 2,4-dichlorophenol to fresh water species</i>	57
<i>Table III. 17: Chronic toxicity of 2,4-dichlorophenol to marine species</i>	57
<i>Table III. 18: Toxicity of 2,4-dichlorophenol to soil organisms</i>	58
<i>Table III. 19: Acute toxicity of 2,5-dichlorophenol to fresh water species</i>	58
<i>Table III. 20: Acute toxicity of 2,5-dichlorophenol to marine species</i>	58
<i>Table III. 21: Acute toxicity of 2,6-dichlorophenol to fresh water species</i>	59
<i>Table III. 22: Acute toxicity of 2,6-dichlorophenol to marine species</i>	59
<i>Table III. 23: Chronic toxicity of 2,6-dichlorophenol to fresh water species</i>	60
<i>Table III. 24: Acute toxicity of 3,4-dichlorophenol to fresh water species</i>	60
<i>Table III. 25: Acute toxicity of 3,4-dichlorophenol to marine species</i>	60
<i>Table III. 26: Toxicity of 3,4-dichlorophenol to soil organisms</i>	61
<i>Table III. 27: Acute toxicity of 3,5-dichlorophenol to fresh water species</i>	62
<i>Table III. 28: Acute toxicity of 3,5-dichlorophenol to marine species</i>	63
<i>Table III. 29: Toxicity of 3,5-dichlorophenol to soil organisms</i>	63
<i>Table III. 30: Acute toxicity of trichlorophenol (not specified) to fresh water species</i>	63
<i>Table III. 31: Acute toxicity of 2,3,4-trichlorophenol to fresh water species</i>	64
<i>Table III. 32: Acute toxicity of 2,3,4-trichlorophenol to marine species</i>	64
<i>Table III. 33: Acute toxicity of 2,3,5-trichlorophenol to fresh water species</i>	65
<i>Table III. 34: Acute toxicity of 2,3,5-trichlorophenol to marine species</i>	65
<i>Table III. 35: Toxicity of 2,3,5-trichlorophenol to soil organisms</i>	65
<i>Table III. 36: Acute toxicity of 2,3,6-trichlorophenol to fresh water species</i>	66
<i>Table III. 37: Acute toxicity of 2,3,6-trichlorophenol to marine species</i>	66
<i>Table III. 38: Acute toxicity of 2,4,5-trichlorophenol to fresh water species</i>	67
<i>Table III. 39: Acute toxicity of 2,4,5-trichlorophenol to marine species</i>	68
<i>Table III. 40: Chronic toxicity of 2,4,5-trichlorophenol to fresh water species</i>	68
<i>Table III. 41: Toxicity of 2,4,5-trichlorophenol to soil organisms</i>	69
<i>Table III. 42: Acute toxicity of 2,4,6-trichlorophenol to fresh water species</i>	70
<i>Table III. 43: Acute toxicity of 2,4,6-trichlorophenol to marine species</i>	71
<i>Table III. 44: Chronic toxicity of 2,4,6-trichlorophenol to fresh water species</i>	71
<i>Table III. 45: Toxicity of 2,4,6-trichlorophenol to soil organisms</i>	72
<i>Table III. 46: Acute toxicity of 3,4,5-trichlorophenol to fresh water species</i>	72
<i>Table III. 47: Acute toxicity of 3,4,5-trichlorophenol to marine species</i>	73
<i>Table III. 48: Acute toxicity of 2,3,4,5-tetrachlorophenol to fresh water species</i>	73
<i>Table III. 49: Acute toxicity of 2,3,4,5-tetrachlorophenol to marine species</i>	74
<i>Table III. 50: Toxicity of 2,3,4,5-tetrachlorophenol to soil organisms</i>	74

<i>Table III. 51: Acute toxicity of 2,3,4,6-tetrachlorophenol to fresh water species</i>	75
<i>Table III. 52: Acute toxicity of 2,3,4,6-tetrachlorophenol to marine species</i>	76
<i>Table III. 53: Acute toxicity of 2,3,5,6-tetrachlorophenol to fresh water species</i>	76
<i>Table III. 54: Acute toxicity of 2,3,5,6-tetrachlorophenol to marine species</i>	77
<i>Table III. 55: Chronic toxicity of 2,3,5,6-tetrachlorophenol to fresh water species</i>	77
<i>Table III. 56: Acute toxicity of pentachlorophenol to fresh water species</i>	78
<i>Table III. 57: Acute toxicity of pentachlorophenol to marine species</i>	82
<i>Table III. 58: Chronic toxicity of pentachlorophenol to fresh water species</i>	84
<i>Table III. 59: Chronic toxicity of pentachlorophenol to marine species</i>	86
<i>Table III. 60: Acute toxicity of pentachlorophenol to soil organisms</i>	87
<i>Table III. 61: Chronic toxicity of pentachlorophenol to soil organisms</i>	87
<i>Table III. 62: Toxicity of pentachlorophenol to terrestrial processes</i>	87
<i>Table III. 63: Deviating tests for pentachlorophenol in soil</i>	87
<i>Table III. 64: Acute toxicity of 1-chloronaphthalene to fresh water species</i>	87
<i>Table III. 65: Acute toxicity of 1-chloronaphthalene to marine species</i>	87
<i>Table III. 66: Chronic toxicity of 1-chloronaphthalene to marine species</i>	87
<i>Table III. 67: Acute toxicity of 2-chloronaphthalene to fresh water species</i>	87
<i>Table III. 68: Acute toxicity of 2-chloronaphthalene to marine species</i>	87

Table III. 1: Acute toxicity of 2-chlorophenol to fresh water species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
protozoa											
<i>Tetrahymena pyriformis</i>	-	S	>95%	7.35	-	am	48 h	EC50	68		Bryant & Schultz, 1994
<i>Tetrahymena pyriformis</i>	-	S	-	-	-	am	48 h	EC50	84		Cronin & Schultz, 1996
bacteriophyta											
Activated sludge bacteria-	-	S	-	7.5	-	am	6 h	IC50	372		Klecka & Landi, 1985
Activated sludge bacteria-	-	S	-	-	-	-	-	IC50	104	a	Beltrame et al., 1984
<i>Bacillus</i> sp.	-	S	-	7	-	am	30 min	EC50	700	b	Liu et al., 1982
<i>Salmonella typhimurium</i>	-	S	-	7	-	am	30 min	EC50	412		Pill et al., 1991
<i>Sirochaeta aurantia</i>	-	S	-	7	-	am	30 min	EC50	167		Pill et al., 1991
algae											
<i>Chlorella vulgaris</i>	N	S	rg	7.5	-	am	96 h	EC50	170		Shigeoka et al., 1988
<i>Pseudokirchneriella subcapitata</i>	N	S	rg	7.5	-	am	96 h	EC50	70		Shigeoka et al., 1988
<i>Scenedesmus subspicatus</i>	N	S	-	8.0	54	am	48 h	EC50	50		Kühn & Pattard, 1990
crustacea											
<i>Daphnia magna</i> , 24 h	Y	R	-	8.0	48	am	24 h	EC50	6.3		Kühn et al., 1989
<i>Daphnia magna</i> , < 72 h	-	S	> 95%	8	200	rw	24 h	EC50	18		Devillers et al., 1987
<i>Daphnia magna</i>	-	S	-	-	-	-	48 h	EC50	23		Knier et al., 1983
<i>Daphnia magna</i> , =< 24 h	-	S	>=80%	8 (7.4-9.4)	160-186	rnw	48 h	LC50	2.6		LeBlanc, 1980
<i>Daphnia magna</i> , 12-24 h	-	S	-	-	-	nw	48 h	EC50	3.9		Keen & Baillod, 1985
<i>Daphnia magna</i> , < 24 h	-	S	-	7.0-8.2	154.5	-	48 h	LC50	6.2		Randall & Knopp, 1980
pisces											
<i>Brachydanio rerio</i>	-	-	-	-	-	-	24 h	LC50	15		Devillers & Chambon, 1986
<i>Carassius auratus</i> , 1-2 g	N	S	-	7.5	20	nw	96 h	LC50	12.4		Pickering & Henderson, 1966
<i>Lepomis macrochirus</i> , 0.32-1.2 g	-	S	>80%	6.5-7.9	32-48	nw	96 h	LC50	6.6		Buccafusco et al., 1981
<i>Lepomis macrochirus</i> , 1-2 g	-	S	-	7.5	20	nw	96 h	LC50	10		Pickering & Henderson, 1966
<i>Pimephales promelas</i>	N	F	-	-	-	-	96 h	LC50	14		Schultz et al., 1986
<i>Pimephales promelas</i> , 1-2 g	N	S	-	7.5	20	nw	96 h	LC50	11.6		Pickering & Henderson, 1966
<i>Pimephales promelas</i> , 1-2 g	N	S	-	8.2	360	nw	96 h	LC50	14.5		Pickering & Henderson, 1966
<i>Pimephales promelas</i>	Y	S	97%	7.8	42.6	nw	96 h	LC50	9.4		Geiger et al., 1988
<i>Pimephales promelas</i> , 30-35 d	-	F	-	7.2	43.3-48.5	nw	96 h	LC50	12		Phipps et al., 1981; Hall & Kier,

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
<i>Poecilia reticulata</i>	-	S	-	7.8	-	-	96 h	LC50	13		1984; Hall et al., 1984
<i>Poecilia reticulata</i>	-	S	-	7.3	-	-	96 h	LC50	11		Könemann & Musch, 1981
<i>Poecilia reticulata</i>	-	S	-	6.1	-	-	96 h	LC50	7		Könemann & Musch, 1981
<i>Poecilia reticulata</i> , 0.1-0.2 g	N	S	-	7.5	20	nw	96 h	LC50	20		Pickering & Henderson, 1966
<i>Poecilia reticulata</i>	-	S	pure	7	80-100	dtw	96 h	LC50	13.8		Saarikoski & Viluksela, 1981

a inhibition of phenol degradation

b dehydrogenase activity

Table III. 2: Acute toxicity of 2-chlorophenol to marine species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
bacteriophyta											
<i>Vibrio fischeri</i>	-	S	-	-	-	am	15 min	EC50	9.3		Zhao & Wang, 1993
<i>Vibrio fischeri</i>	-	S	-	-	-	am	15 min	EC50	39.7		Ribo & Kaiser, 1983
crustacea											
<i>Crangon septemspinosa</i> , 2.4-4.5 g	N	S	-	-	30	nw	96 h	LC50	5.3		McLeese et al., 1979

Table III. 3: Chronic toxicity of 2-chlorophenol to fresh water species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
crustacea											
<i>Daphnia magna</i> , 24 h	Y	R	-	8.0	48	am	21 d	NOEC	0.50		Kühn et al., 1989

Table III. 4: Toxicity of 2-chlorophenol to soil organisms

organism	soil type	pH	% om	% clay	temp [° C]	exp. time	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	result test soil [mg/kg _{d.w.}]	result stand. soil [mg/kg _{d.w.}]	note	reference
macrophyta														
<i>Lactuca sativa</i>	OECD	7.8	1.4	12	20	14 d	EC50	43				215	a	Hulzebos et al., 1993

a growth

Table III. 5: Acute toxicity of 3-chlorophenol to fresh water species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
protozoa											
<i>Tetrahymena pyriformis</i>	-	S	>95%	7.35	-	am	48 h	EC50	14.2		Bryant & Schultz, 1994
<i>Tetrahymena pyriformis</i>	-	S	-	-	-	am	48 h	EC50	17.3		Bryant & Schultz, 1994
bacteriophyta											
Activated sludge bacteria	-	S	-	-	-	-	-	IC50	67	b	Beltrame et al., 1984
<i>Bacillus</i> sp.	-	S	-	7	-	am	30 min	EC50	450	a	Liu et al., 1982
algae											
<i>Pseudokirchneriella subcapitata</i>	N	S	rg	7.5	-	am	96 h	EC50	29		Shigeoka et al., 1988
crustacea											
<i>Daphnia magna</i> , < 72 h	-	S	> 95%	8	200	rw	24 h	EC50	15.8		Devillers et al., 1987
pisces											
<i>Brachydanio rerio</i>	-	-	-	-	-	-	24 h	LC50	15		Devillers & Chambon, 1986
<i>Poecilia reticulata</i>	-	S	-	7.8	-	-	96 h	LC50	8		Könemann & Musch, 1981
<i>Poecilia reticulata</i>	-	S	-	7.3	-	-	96 h	LC50	6		Könemann & Musch, 1981
<i>Poecilia reticulata</i>	-	S	-	6.1	-	-	96 h	LC50	6		Könemann & Musch, 1981

a dehydrogenase activity

b inhibition of phenol degradation

Table III. 6: Acute toxicity of 3-chlorophenol to marine species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
bacteriophyta <i>Vibrio fischeri</i>	-	S	-	-	-	am	15 min	EC50	13.2		Ribo & Kaiser, 1983

Table III. 7: Toxicity of 3-chlorophenol to soil organisms

organism	soil type	pH	% om	% clay	temp [° C]	exp. time	criterion	result test soil [mg/kg _{d.w.}]	result stand. soil [mg/kg _{d.w.}]	note	reference
annelida											
<i>Eisenia andrei</i> , adult	peat	3.8	15.6	9.0	23	14 d	LC50	423	271		Van Gestel & Ma, 1990
<i>Eisenia andrei</i> , adult	artificial soil	6.0	8.1	8.1	23	14 d	LC50	130	160		Van Gestel & Ma, 1990
<i>Eisenia andrei</i> , adult	sand	5.6	6.1	2.4	23	14 d	LC50	134	220		Van Gestel & Ma, 1990
<i>Eisenia andrei</i> , adult	sand	5.0	3.7	1.4	23	14 d	LC50	75	203		Van Gestel & Ma, 1990
<i>Lumbricus rubellus</i> , adult	peat	3.8	15.6	9.0	23	14 d	LC50	633	406		Van Gestel & Ma, 1990
<i>Lumbricus rubellus</i> , adult	artificial soil	6.0	8.1	8.1	23	14 d	LC50	247	305		Van Gestel & Ma, 1990
<i>Lumbricus rubellus</i> , adult	sand	5.6	6.1	2.4	23	14 d	LC50	342	561		Van Gestel & Ma, 1990
<i>Lumbricus rubellus</i> , adult	sand	5.0	3.7	1.4	23	14 d	LC50	150	405		Van Gestel & Ma, 1990
macrophyta <i>Lactuca sativa</i>	OECD	7.8	1.4	12	20	14 d	EC50	7	35	a	Hulzebos et al., 1993

a growth

Table III. 8: Acute toxicity of 4-chlorophenol to fresh water species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
protozoa											
<i>Tetrahymena pyriformis</i>	-	S	>95%	7.35	-	am	48 h	EC50	36.7		Bryant & Schultz, 1994
bacteriophyta											
Activated sludge bacteria	-	S	-	7.5	-	am	6 h	IC50	155		Klecka & Landi, 1985
Activated sludge bacteria	-	S	-	-	-	-	-	IC50	71	a	Beltrame et al., 1984
<i>Bacillus</i> sp.	-	S	-	7	-	am	30 min	EC50	400	b	Liu et al., 1982
<i>Escherichia coli</i>	-	S	-	-	-	am	12-16 h	EC50	131		Nendza & Seydel, 1988
algae											
<i>Chlorella vulgaris</i>	N	S	rg	7.5	-	am	96 h	EC50	29		Shigeoka et al., 1988
<i>Pseudokirchneriella subcapitata</i>	N	S	rg	7.5	-	am	96 h	EC50	38		Shigeoka et al., 1988
<i>Pseudokirchneriella subcapitata</i>	-	S	-	-	-	-	96 h	EC50	5.01		LeBlanc, 1984
<i>Scenedesmus subspicatus</i>	N	S	-	8.0	54	am	96 h	EC50	8		Kühn & Pattard, 1990
crustacea											
<i>Ceriodaphnia dubia</i>	-	S	-	8.2	90-110	nw	48 h	LC50	9		Cowgill & Milazzo, 1991
<i>Daphnia magna</i> , < 12 h	-	S	-	8.2	160-180	nw	48 h	LC50	6		Cowgill & Milazzo, 1991
<i>Daphnia magna</i> , 6-24 h	N	S	-	8.0	240	am	24 h	EC50	3.4		Kühn et al., 1989
<i>Daphnia magna</i> , 6-24 h	N	S	-	8.0	240	am	48 h	EC50	2.5		Kühn et al., 1989
<i>Daphnia magna</i> , 24 h	Y	R	-	8.0	48	am	24 h	EC50	8.6		Kühn et al., 1989
<i>Daphnia magna</i> , < 72 h	-	S	> 95%	8	200	rw	24 h	EC50	8.1		Devillers et al., 1987
<i>Daphnia magna</i> , =< 24 h	-	S	>=80%	8 (7.4-9.4)	160-186	rnw	48 h	LC50	4.1		LeBlanc, 1980
macrophyta											
<i>Lemma gibba</i>	-	S	-	4.9	636	am	7 d	EC50	54-56	c	Cowgill et al., 1991
<i>Lemma minor</i>	-	S	-	4.9	636	am	7 d	EC50	25-41	c	Cowgill et al., 1991
pisces											
<i>Brachydanio rerio</i>	-	-	-	-	-	-	24 h	LC50	8.7		Devillers & Chambon, 1986
<i>Lepomis macrochirus</i> , 0.32-1.2 g	-	S	>80%	6.5-7.9	32-48	nw	96 h	LC50	3.8		Buccafusco et al., 1981
<i>Oncorhynchus mykiss</i>	Y	F	rg	-	-	dtw	96 h	LC50	1.9	α	Hodson et al., 1984
<i>Pimephales promelas</i>	N	S	rg	7.9	96-125	nw	96 h	LC50	4.2	d	Mayes et al., 1983
<i>Pimephales promelas</i>	-	F	-	-	-	nw	96 h	LC50	6.2		Baerden & Schultz, 1997
<i>Poecilia reticulata</i>	-	S	pure	5	80-100	dtw	96 h	LC50	6.3		Saarikoski & Viiluksela, 1981
<i>Poecilia reticulata</i>	-	S	pure	6	80-100	dtw	96 h	LC50	7.8		Saarikoski & Viiluksela, 1981

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
<i>Poecilia reticulata</i>	-	S	pure	7	80-100	dtw	96 h	LC50	8.5		Saarikoski & Viluksela, 1981
<i>Poecilia reticulata</i>	-	S	pure	8	80-100	dtw	96 h	LC50	9.0		Saarikoski & Viluksela, 1981

a inhibition of phenol degradation

b dehydrogenase activity

c results for number of plants, number of fronds and dry weight

d geometric mean of 96 h LC50-values found for fry, juvenile and subadults

Table III. 9: Acute toxicity of 4-chlorophenol to marine species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
bacteriophyta											
<i>Vibrio fischeri</i>	-	S	-	-	-	am	15 min	EC50	4.3		Zhao & Wang, 1993
<i>Vibrio fischeri</i>	-	S	-	-	-	am	15 min	EC50	9.1		Ribo & Kaiser, 1983
algae											
<i>Skeletonema costatum</i>	-	S	-	-	-	-	96 h	EC50	3.3		LeBlanc, 1984
<i>Skeletonema costatum</i>	N	S	rg	8.2	-	am	120 h	EC50	13		Cowgill et al., 1989
annelida											
<i>Platynereis dumerilii</i> , embryos, < 6h post fertilization	N	S	> 90%	-	35	nw	48 h	EC50	23.6	a	Palau-Casellas & Hutchinson, 1998
<i>Platynereis dumerilii</i> , 7-d-old larvae	N	S	> 90%	-	35	nw	96 h	LC50	13.3		Palau-Casellas & Hutchinson, 1998
crustacea											
<i>Crangon septemspinosa</i> , 2.4-4.5 g	N	S	-	-	30	nw	96 h	LC50	4.6		McLeese et al., 1979
<i>Mesidotea entomon</i>	Y	F	-	7.7	6	nw	96 h	LC50	42, 28	b	Oksama & Kristofferson, 1979
<i>Mysidopsis bahia</i>	-	S	-	-	-	-	96 h	LC50	29.7		LeBlanc, 1984
pisces											
<i>Cyprinodon variegatus</i> , 8-15 mm	N	S	-	-	10-31	nw	96 h	LC50	5.4		Heitmuller et al., 1981

a normal embryo-larval development

b temperatures 5 and 10 °C, respectively

Table III. 10: Chronic toxicity of 4-chlorophenol to fresh water species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
crustacea											
<i>Ceriodaphnia dubia</i>	-	S	-	8.2	90-110	nw	10 d	NOEC	0.2	a	Cowgill & Milazzo, 1991
<i>Ceriodaphnia dubia</i>	-	S	-	8.2	90-110	nw	10 d	NOEC	1.6	b, c, d	Cowgill & Milazzo, 1991
<i>Daphnia magna</i> , < 12 h	-	S	-	8.2	160-180	nw	12 d	NOEC	2.6	a, c	Cowgill & Milazzo, 1991
<i>Daphnia magna</i> , < 12 h	-	S	-	8.2	160-180	nw	12 d	NOEC	0.6	b	Cowgill & Milazzo, 1991
<i>Daphnia magna</i> , < 12 h	-	S	-	8.2	160-180	nw	12 d	NOEC	0.3	d	Cowgill & Milazzo, 1991
<i>Daphnia magna</i> , 24 h	Y	R	-	8.0	48	am	21 d	NOEC	0.63	a	Kühn et al., 1989

a mortality

b total progeny

c number of broods

d mean brood size

Table III. 11: Chronic toxicity of 4-chlorophenol to marine species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
algae											
<i>Skeletonema costatum</i>	N	S	rg	8.2	-	am	120 h	NOEC	1.08	a	Cowgill et al., 1989
<i>Skeletonema costatum</i>	N	S	rg	8.2	-	am	120 h	NOEC	0.39	b	Cowgill et al., 1989

a total cell count

b total cell volume

Table III. 12: Acute toxicity of 2,3-dichlorophenol to fresh water species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
protozoa											
<i>Tetrahymena pyriformis</i>	-	S	>95%	7.35	-	am	48 h	EC50	8.6		Cronin & Schultz, 1996
bacteriophyta											
Activated sludge bacteria	-	S	-	-	-	-	-	IC50	55	b	Beltrame et al., 1984
<i>Bacillus</i> sp.	-	S	-	7	-	am	30 min	EC50	130	a	Liu et al., 1982
<i>Escherichia coli</i>	-	S	-	-	-	am	12-16 h	EC50	46		Nendza & Seydel, 1988
algae											
<i>Pseudokirchneriella subcapitata</i>	N	S	rg	7.5	-	am	96 h	EC50	5.0		Shigeoka et al., 1988
crustacea											
<i>Daphnia magna</i> , 6-24 h	N	S	-	8.0	240	am	24 h	EC50	4.1		Kühn et al., 1989
<i>Daphnia magna</i> , 6-24 h	N	S	-	8.0	240	am	48 h	EC50	3.1		Kühn et al., 1989
<i>Daphnia magna</i> , < 72 h	-	S	> 95%	8	200	rw	24 h	EC50	5.2		Devillers et al., 1987
pisces											
<i>Brachydanio rerio</i>	-	-	-	-	-	-	24 h	LC50	4.7		Devillers & Chambon, 1986

a dehydrogenase activity

b inhibition of phenol degradation

Table III. 13: Acute toxicity of 2,3-chlorophenol to marine species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
bacteriophyta											
<i>Vibrio fischeri</i>	-	S		-	-	am	15 min	EC50	4.8		Ribo & Kaiser, 1983

Table III. 14: Acute toxicity of 2,4-dichlorophenol to fresh water species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
protozoa											
<i>Tetrahymena pyriformis</i>	-	S	>95%	7.35	-	am	48 h	EC50	15		Schultz et al., 1986, 1987
bacteriophyta											
Activated sludge bacteria	-	S	-	7.5	-	am	6 h	IC50	53		Klecka & Landi, 1985
Activated sludge bacteria	-	S	-	-	-	-	-	IC50	47	a	Beltrame et al., 1984
<i>Bacillus</i> sp.	-	S	-	7	-	am	30 min	EC50	75	b	Liu et al., 1982
<i>Escherichia coli</i>	-	S	-	-	-	am	12-16 h	EC50	54		Nendza & Seydel, 1988
<i>Salmonella typhimurium</i>	-	S	-	7	-	am	30 min	EC50	78		Pill et al., 1991
<i>Sirochaeta aurantia</i>	-	S	-	7	-	am	30 min	EC50	20		Pill et al., 1991
mycophyta											
<i>Pichia</i> sp.	-	S	-	-	-	am	12 h	EC50	43		German Chemical Society, 1988
<i>Rhodotorula rubra</i>	-	S	-	-	-	am	12 h	EC50	17		German Chemical Society, 1988
macrophyta											
<i>Lemna minor</i>	-	S	-	-	-	-	-	EC50	58	c	German Chemical Society, 1988
algae											
<i>Chlorella vulgaris</i>	N	S	rg	7.5	-	am	96 h	EC50	9.2		Shigeoka et al., 1988
<i>Scenedesmus subspicatus</i>	N	S	-	8.0	54	am	48 h	EC50	11.5		Kühn & Pattard, 1990
<i>Selenastrum capricornutum</i>	N	S	rg	7.5	-	am	96 h	EC50	14		Shigeoka et al., 1988
crustacea											
<i>Daphnia magna</i> , 6-24 h	N	S	-	8.0	240	am	24 h	EC50	2.5		Kühn et al., 1989
<i>Daphnia magna</i> , 6-24 h	N	S	-	8.0	240	am	48 h	EC50	1.4		Kühn et al., 1989
<i>Daphnia magna</i> , 24 h	Y	R	-	8.0	48	am	24 h	EC50	3.9		Kühn et al., 1989
<i>Daphnia magna</i> , 24 h	N	S	-	7.6	272	am	24 h	LC50	11		Bringmann & Kühn, 1977a
<i>Daphnia magna</i> , < 72 h	-	S	> 95%	8	200	rw	24 h	EC50	2.7		Devillers et al., 1987
<i>Daphnia magna</i> , =< 24 h	-	S	>=80%	8 (7.4-9.4)	160-186	rnw	48 h	LC50	2.6		LeBlanc, 1980
pisces											
<i>Brachydanio rerio</i>	N	S	-	7.5	-	-	96 h	LC50	3.9		Wellens, 1982
<i>Brachydanio rerio</i>	-	-	-	-	-	-	24 h	LC50	4.8		Devillers & Chambon, 1986
<i>Carassius auratus</i> , 2 g	N	S	-	-	-	-	24 h	LC50	7.8		Kobayashi et al., 1979
<i>Carassius auratus</i> , 2.5 g	Y	F	-	7.2	41-48	nw	96 h	LC50	23		Holcombe et al., 1987

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
<i>Lepomis macrochirus</i> , 1.1 g	Y	F	-	7.2	41-48	nw	96 h	LC50	4		Holcombe et al., 1987
<i>Lepomis macrochirus</i> , 0.32-1.2 g	-	S	>80%	6.5-7.9	32-48	nw	96 h	LC50	2		Buccafusco et al., 1981
<i>Leuciscus idus melanotus</i>	N	S	-	7-8	255	tap	48 h	LC50	5		Juhnke & Lüdemann, 1978
<i>Oncorhynchus mykiss</i>	Y	F	rg	7.9	135	dtw	96 h	LC50	2.6	α	Hodson et al., 1984
<i>Oncorhynchus mykiss</i> , 13.1 g	Y	F	-	7.2	41-48	nw	96 h	LC50	1.16		Holcombe et al., 1987
<i>Pimephales promelas</i> , 30-35 d	N	F	-			nw		LC50	8.2		Hall & Kier, 1984; Hall et al., 1984; Phipps et al., 1981
<i>Pimephales promelas</i> , 0.3 g	Y	F	-	7.2	41-48	nw	96 h	LC50	8.39		Holcombe et al., 1987
<i>Pimephales promelas</i>	N	F	-	-	-	-	96 h	LC50	7.7		Schultz et al., 1986
<i>Pimephales promelas</i>	Y	S	97%	7.4	45.2	nw	96 h	LC50	7.8		Geiger et al., 1985
<i>Poecilia reticulata</i>	-	S	-	7.8	-	-	96 h	LC50	5.9		Könemann & Musch, 1981
<i>Poecilia reticulata</i>	-	S	-	7.3	-	-	96 h	LC50	4.2		Könemann & Musch, 1981
<i>Poecilia reticulata</i>	-	S	-	6.1	-	-	96 h	LC50	3.3		Könemann & Musch, 1981
<i>Poecilia reticulata</i>	-	S	pure	6	80-100	dtw	96 h	LC50	3.5		Saarikoski & Viluksela, 1981
<i>Poecilia reticulata</i>	-	S	pure	7	80-100	dtw	96 h	LC50	5.5		Saarikoski & Viluksela, 1981
<i>Poecilia reticulata</i>	-	S	pure	8	80-100	dtw	96 h	LC50	7.6		Saarikoski & Viluksela, 1981

a inhibition of phenol degradation

b dehydrogenase activity

c reduction in chlorophyll content

Table III. 15: Acute toxicity of 2,4-dichlorophenol to marine species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
bacteriophyta											
<i>Vibrio fischeri</i>	-	S	-	-		am	15 min	EC50	5.8		Zhao & Wang, 1993
<i>Vibrio fischeri</i>	-	S	-	-		am	15 min	EC50	5.0		Ribo & Kaiser, 1983

Table III. 16: Chronic toxicity of 2,4-dichlorophenol to fresh water species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
protozoa											
<i>Chilomonas paramecium</i>	N	S	-	6.9	142	am	48 h	NOEC	5.8		Bringmann et al., 1980
<i>Entosiphon sulcatum</i>	N	S	-	6.9	142	am	72 h	NOEC	0.50		Bringmann, 1978
<i>Uronema parduczi</i>	N	S	-	6.9	142	am	20 h	NOEC	1.6		Bringmann & Kühn, 1980b
bacteriophyta											
<i>Pseudomonas putida</i>	N	S	-	7.0	60	am	16 h	NOEC	6		Bringmann & Kühn, 1976
cyanophyta											
<i>Microcystis aeruginosa</i>	N	S	-	7.0	60	am	8 d	NOEC	2		Bringmann & Kühn, 1978a,b
<i>Scenedesmus quadricauda</i>	N	S	-	7.0	-	am	8 d	NOEC	3.6		Bringmann & Kühn, 1977b
crustacea											
<i>Daphnia magna</i> , 24 h	Y	R	-	8.0	48	am	21 d	NOEC	0.32		Kühn et al., 1989
<i>Daphnia magna</i>	Y	S	99.9%	-	170	nw	21 d	NOEC	0.74	a	Gersich & Milazzo, 1988
<i>Daphnia magna</i>	Y	S	99.9%	-	170	nw	21 d	NOEC	1.48	b	Gersich & Milazzo, 1988
<i>Daphnia magna</i>	Y	S	99.9%	-	170	nw	21 d	NOEC	0.74	c	Gersich & Milazzo, 1988

a mortality

b growth

c reproduction

Table III. 17: Chronic toxicity of 2,4-dichlorophenol to marine species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
phacophyta (macrophyta)											
<i>Phyllospora comosa</i> , 1-d-old zygote	-	S	99%	7	34	nw	96 h	NOEC	< 10 E-6	a	Burridge et al., 1995
<i>Phyllospora comosa</i> , 7-d-old embryo	-	S	99%	7	34	nw	96 h	NOEC	10 E-4	a	Burridge et al., 1995
crustacea											
<i>Allorchestes compressa</i> , 7 mm	-	S	99%	8	34	nw	96 h	NOEC	0.075	a	Burridge et al., 1995
<i>Allorchestes compressa</i> , 10 mm	-	S	99%	8	34	nw	96 h	NOEC	0.05	a	Burridge et al., 1995
<i>Allorchestes compressa</i> , 12 mm	-	S	99%	8	34	nw	96 h	NOEC	0.075	a	Burridge et al., 1995

a mortality

Table III. 18: Toxicity of 2,4-dichlorophenol to soil organisms

organism	soil type	pH	% om	% clay	temp [° C]	exp. time	criterion	result test soil [mg/kg _{d.w.}]	result stand. soil [mg/kg _{d.w.}]	note	reference
macrophyta <i>Lactuca sativa</i>	OECD	7.8	1.4	12	20	14 d	EC50	53	265	a	Hulzebos et al., 1993
a growth											

Table III. 19: Acute toxicity of 2,5-dichlorophenol to fresh water species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
protozoa <i>Tetrahymena pyriformis</i>	-	S	-	-	-	am	48 h	EC50	12		Cronin & Schultz, 1996
bacteriophyta Activated sludge bacteria	-	S	-	-	-	-	-	IC50	50	a	Beltrame et al., 1984
<i>Bacillus</i> sp.	-	S	-	7	-	am	30 min	EC50	85	b	Liu et al., 1982
crustacea <i>Daphnia magna</i> , < 72 h	-	S	> 95%	8	200	rw	24 h	EC50	4.9		Devillers et al., 1987
pisces <i>Brachydanio rerio</i>	-	-	-	-	-	-	24 h	LC50	3.1		Devillers & Chambon, 1986

a inhibition of phenol degradation

b dehydrogenase activity

Table III. 20: Acute toxicity of 2,5-dichlorophenol to marine species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
bacteriophyta <i>Vibrio fischeri</i>	-	S	-	-	-	am	15 min	EC50	9.6		Ribo & Kaiser, 1983

Table III. 21: Acute toxicity of 2,6-dichlorophenol to fresh water species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
protozoa											
<i>Tetrahymena thermophila</i>	-	S	-	7.4	-	am	48 h	EC50	26		Pauli et al., 1993
<i>Tetrahymena pyriformis</i>	-	S	-	-	-	am	48 h	EC50	30		Cronin & Schultz, 1996
bacteriophyta											
Activated sludge bacteria	-	S	-	-	-	-	-	IC50	65	a	Beltrame et al., 1984
<i>Bacillus</i> sp.	-	S	-	7	-	am	30 min	EC50	550	b	Liu et al., 1982
<i>Escherichia coli</i>	-	S	-	-	-	am	12-16 h	EC50	117		Nendza & Seydel, 1988
algae											
<i>Chlorella vulgaris</i>	N	S	rg	7.5	-	am	96 h	EC50	9.7		Shigeoka et al., 1988
<i>Selenastrum capricornutum</i>	N	S	rg	7.5	-	am	96 h	EC50	29		Shigeoka et al., 1988
crustacea											
<i>Daphnia magna</i> , 6-24 h	N	S	-	8.0	240	am	24 h	EC50	6.0		Kühn et al., 1989
<i>Daphnia magna</i> , 6-24 h	N	S	-	8.0	240	am	48 h	EC50	3.4		Kühn et al., 1989
<i>Daphnia magna</i> , < 72 h	-	S	> 95%	8	200	rw	24 h	EC50	9.4		Devillers et al., 1987
pisces											
<i>Brachydanio rerio</i>	-	-	-	-	-	-	24 h	LC50	7.3		Devillers & Chambon, 1986
<i>Poecilia reticulata</i>	-	S	pure	6	80-100	dtw	96 h	LC50	3.9		Saarikoski & Viluksela, 1981
<i>Poecilia reticulata</i>	-	S	pure	7	80-100	dtw	96 h	LC50	7.8		Saarikoski & Viluksela, 1981
<i>Poecilia reticulata</i>	-	S	pure	8	80-100	dtw	96 h	LC50	17.9		Saarikoski & Viluksela, 1981

a inhibition of phenol degradation

b dehydrogenase activity

Table III. 22: Acute toxicity of 2,6-dichlorophenol to marine species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
bacteriophyta											
<i>Vibrio fischeri</i>	-	S	-	-	-	am	15 min	EC50	13.6		Ribo & Kaiser, 1983
crustacea											
<i>Crangon septemspinosa</i> , 2.4-4.5 g	N	S	-	-	30	nw	52 h	LC50	19.1		McLeese et al., 1979

Table III. 23: Chronic toxicity of 2,6-dichlorophenol to fresh water species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
protozoa											
<i>Tetrahymena thermophila</i>	-	S	-	7.4	-	am	48 h	NOEC	20		Pauli et al., 1993

Table III. 24: Acute toxicity of 3,4-dichlorophenol to fresh water species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
protozoa											
<i>Tetrahymena pyriformis</i>	-	S	>95%	7.35	-	am	48 h	EC50	3.0		Bryant & Schultz, 1994
bacteriophyta											
Activated sludge bacteria	-	S	-	-	-	-	-	IC50	43	a	Beltrame et al., 1984
<i>Bacillus</i> sp.	-	S	-	7	-	am	30 min	EC50	52	b	Liu et al., 1982
algae											
<i>Selenastrum capricornutum</i>	N	S	rg	7.5	-	am	96 h	EC50	3.2		Shigeoka et al., 1988
crustacea											
<i>Daphnia magna</i> , < 72 h	-	S	> 95%	8	200	rw	24 h	EC50	2.8		Devillers et al., 1987
pisces											
<i>Brachydanio rerio</i>	-	-	-	-	-	-	24 h	LC50	1.7		Devillers & Chambon, 1986

a inhibition of phenol degradation

b dehydrogenase activity

Table III. 25: Acute toxicity of 3,4-dichlorophenol to marine species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
bacteriophyta											
<i>Vibrio fischeri</i>	-	S	-	-	-	am	15 min	EC50	9.3		Zhao & Wang, 1993
<i>Vibrio fischeri</i>	-	S	-	-	-	am	15 min	EC50	1.7		Ribo & Kaiser, 1983
crustacea											
<i>Crangon septemspinosa</i> , 2.4-4.5 g	N	S	-	-	30	nw	96 h	LC50	5.3		McLeese et al., 1979

Table III. 26: Toxicity of 3,4-dichlorophenol to soil organisms

organism	soil type	pH	% om	% clay	temp [° C]	exp. time	criterion	result test soil [mg/kg _{d.w.}]	result stand. soil [mg/kg _{d.w.}]	note	reference
annelida											
<i>Eisenia andrei</i> , adult	peat	3.8	15.6	9.0	23	14 d	LC50	423	271		Van Gestel & Ma, 1990
<i>Eisenia andrei</i> , adult	artificial soil	6.0	8.1	8.1	23	14 d	LC50	172	212		Van Gestel & Ma, 1990
<i>Eisenia andrei</i> , adult	sand	5.6	6.1	2.4	23	14 d	LC50	240	393		Van Gestel & Ma, 1990
<i>Eisenia andrei</i> , adult	sand	5.0	3.7	1.4	23	14 d	LC50	134	362		Van Gestel & Ma, 1990
<i>Lumbricus rubellus</i> , adult	peat	3.8	15.6	9.0	23	14 d	LC50	680	436		Van Gestel & Ma, 1990
<i>Lumbricus rubellus</i> , adult	artificial soil	6.0	8.1	8.1	23	14 d	LC50	322	398		Van Gestel & Ma, 1990
<i>Lumbricus rubellus</i> , adult	sand	5.6	6.1	2.4	23	14 d	LC50	486	797		Van Gestel & Ma, 1990
<i>Lumbricus rubellus</i> , adult	sand	5.0	3.7	1.4	23	14 d	LC50	352	951		Van Gestel & Ma, 1990

Table III. 27: Acute toxicity of 3,5-dichlorophenol to fresh water species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
protozoa											
<i>Tetrahymena pyriformis</i>	-	S	>95%	7.35	-	am	48 h	EC50	4.5		Bryant & Schultz, 1994
bacteriophyta											
Activated sludge bacteria	-	S	-	7.5	-	am	6 h	IC50	12	a	Klecka & Landi, 1985
Activated sludge bacteria	-	S	-	-	-	-	-	IC50	58	b	Beltrame et al., 1984
<i>Bacillus</i> sp.	-	S	-	7	-	am	30 min	EC50	25	c	Liu et al., 1982
algae											
<i>Selenastrum capricornutum</i>	N	S	rg	7.5	-	am	96 h	EC50	2.3		Shigeoka et al., 1988
crustacea											
<i>Daphnia magna</i> , 24 h	N	S	-	8	250	am	24 h	LC50	2.8		Bringmann & Kühn, 1982
<i>Daphnia magna</i> , < 72 h	-	S	> 95%	8	200	rw	24 h	EC50	2.1		Devillers et al., 1987
<i>Streptocephalus proboscideus</i>	N	S	ag	-	-	am	24 h	LC50	4.13		Crisinel et al., 1994
<i>Streptocephalus rubricaudatus</i> , cyst	N	S	ag	-	-	am	24 h	LC50	4.19		Crisinel et al., 1994
<i>Streptocephalus texanus</i> , cyst	N	S	ag	-	-	am	24 h	LC50	4.18		Crisinel et al., 1994
pisces											
<i>Brachydanio rerio</i>	-	-	-	-	-	-	24 h	LC50	1.7		Devillers & Chambon, 1986
<i>Poecilia reticulata</i>	-	S	-	7.8	-	-	96 h	LC50	4.7		Könemann & Musch, 1981
<i>Poecilia reticulata</i>	-	S	-	7.3	-	-	96 h	LC50	2.7		Könemann & Musch, 1981
<i>Poecilia reticulata</i>	-	S	-	6.1	-	-	96 h	LC50	2.6		Könemann & Musch, 1981

a respiration inhibition

b inhibition of phenol degradation

c dehydrogenase activity

Table III. 28: Acute toxicity of 3,5-dichlorophenol to marine species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
bacteriophyta <i>Vibrio fischeri</i>	-	S	-	-	-	am	15 min	EC50	3.2		Ribo & Kaiser, 1983
crustacea <i>Artemia salina</i> , cysts	N	S	ag	-	35 o/oo	rnw	24 h	LC50	8.9		Crisinel et al., 1994
<i>Crangon septemspinosa</i> , 2.4-4.5 g	N	S	-	-	30 o/oo	nw	96 h	LC50	1.5		McLeese et al., 1979
annelida <i>Platynereis dumerilii</i> , embryos, < 6h post fertilization	N	S	> 90%	-	35o/oo	nw	48 h	EC50	4.24	a	Palau-Casellas & Hutchinson, 1998
<i>Platynereis dumerilii</i> , 7-d-old larvae	N	S	> 90%	-	35o/oo	nw	96 h	LC50	1.94		Palau-Casellas & Hutchinson, 1998

a normal embryonal development

Table III. 29: Toxicity of 3,5-dichlorophenol to soil organisms

organism	soil type	pH	% om	% clay	temp [° C]	exp. time	criterion	result test soil [mg/kg _{d.w.}]	result stand. soil [mg/kg _{d.w.}]	note	reference
macrophyta <i>Lactuca sativa</i>	OECD	7.8	1.4	12	20	14 d	EC50	32	160	a	Hulzebos et al., 1993

a growth

Table III. 30: Acute toxicity of trichlorophenol (not specified) to fresh water species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
bacteriophyta <i>Rhizobium meliloti</i>	-	S	-	7.5	-	am	20 min	EC50	4		Botsford et al., 1997

Table III. 31: Acute toxicity of 2,3,4-trichlorophenol to fresh water species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
bacteriophyta											
Activated sludge bacteria	-	S	-	-	-	-	-	IC50	27	a	Beltrame et al., 1984
<i>Bacillus</i> sp.	-	S	-	7	-	am	30 min	EC50	13	b	Liu et al., 1982
algae											
<i>Selenastrum capricornutum</i>	N	S	rg	7.5	-	am	96 h	EC50	2.0		Shigeoka et al., 1988
crustacea											
<i>Daphnia magna</i> , < 72 h	-	S	> 95%	8	200	rw	24 h	EC50	2.2		Devillers et al., 1987
pisces											
<i>Brachydanio rerio</i>	-	-	-	-	-	-	24 h	LC50	1.9		Devillers & Chambon, 1986

a inhibition of phenol degradation

b dehydrogenase activity

Table III. 32: Acute toxicity of 2,3,4-trichlorophenol to marine species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
bacteriophyta											
<i>Vibrio fischeri</i>	-	S	-	-	-	am	15 min	EC50	1.6		Ribo & Kaiser, 1983
crustacea											
<i>Crangon septemspinosa</i> , 2.4-4.5 g	N	S	-	-	30 o/oo	nw	96 h	LC50	2.0		McLeese et al., 1979

Table III. 33: Acute toxicity of 2,3,5-trichlorophenol to fresh water species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
protozoa											
<i>Tetrahymena pyriformis</i>	-	S	>95%	7.35	-	am	48 h	EC50	0.84		Bryant & Schultz, 1994
bacteriophyta											
Activated sludge bacteria	-	S	-	-	-	-	-	IC50	22	a	Beltrame et al., 1984
<i>Bacillus</i> sp.	-	S	-	7	-	am	30 min	EC50	10	b	Liu et al., 1982
crustacea											
<i>Daphnia magna</i> , < 72 h	-	S	> 95%	8	200	rw	24 h	EC50	2.3		Devillers et al., 1987
pisces											
<i>Brachydanio rerio</i>	-	-	-	-	-	-	24 h	LC50	1.4		Devillers & Chambon, 1986
<i>Poecilia reticulata</i>	-	S	-	7.8	-	-	96 h	LC50	4.7		Könemann & Musch, 1981
<i>Poecilia reticulata</i>	-	S	-	7.3	-	-	96 h	LC50	1.6		Könemann & Musch, 1981
<i>Poecilia reticulata</i>	-	S	-	6.1	-	-	96 h	LC50	0.9		Könemann & Musch, 1981

a inhibition of phenol degradation

b dehydrogenase activity

Table III. 34: Acute toxicity of 2,3,5-trichlorophenol to marine species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
bacteriophyta											
<i>Vibrio fischeri</i>	-	S	-	-	-	am	15 min	EC50	1.4		Ribo & Kaiser, 1983

Table III. 35: Toxicity of 2,3,5-trichlorophenol to soil organisms

organism	soil type	pH	% om	% clay	temp [° C]	exp. time	criterion	result test soil [mg/kg _{d.w.}]	result stand. soil [mg/kg _{d.w.}]	note	reference
macrophyta											
<i>Lactuca sativa</i>	OECD	7.5	1.6	-	23	14d	NOEC	3.2	16	a	Adema & Henzen, 1989
<i>Lactuca sativa</i>	OECD	7.5	1.6	-	23	7 d	NOEC	1	5	a	Adema & Henzen, 1989
<i>Lactuca sativa</i>	OECD	7.8	1.4	12	20	14 d	EC50	9	45	a	Hulzebos et al., 1993

a growth

Table III. 36: Acute toxicity of 2,3,6-trichlorophenol to fresh water species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
bacteriophyta											
Activated sludge bacteria	-	S	-	-	-	-	-	IC50	39	a	Beltrame et al., 1984
<i>Bacillus</i> sp.	-	S	-	7	-	am	30 min	EC50	190	b	Liu et al., 1982
crustacea											
<i>Daphnia magna</i> , < 72 h	-	S	> 95%	8	200	rw	24 h	EC50	7.4		Devillers et al., 1987
pisces											
<i>Brachydanio rerio</i>	-	-	-	-	-	-	24 h	LC50	7.5		Devillers & Chambon, 1986
<i>Poecilia reticulata</i>	-	S	-	7.8	-	-	96 h	LC50	13.4		Könemann & Musch, 1981
<i>Poecilia reticulata</i>	-	S	-	7.3	-	-	96 h	LC50	5.1		Könemann & Musch, 1981
<i>Poecilia reticulata</i>	-	S	-	6.1	-	-	96 h	LC50	0.9		Könemann & Musch, 1981

a inhibition of phenol degradation

b dehydrogenase activity

Table III. 37: Acute toxicity of 2,3,6-trichlorophenol to marine species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
bacteriophyta											
<i>Vibrio fischeri</i>	-	S	-	-	-	am	15 min	EC50	13.3		Ribo & Kaiser, 1983
crustacea											
<i>Crangon septemspinosa</i> , 2.4-4.5 g	N	S	-	-	30 o/oo	nw	96 h	LC50	2.7		McLeese et al., 1979

Table III. 38: Acute toxicity of 2,4,5-trichlorophenol to fresh water species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
protozoa											
<i>Tetrahymena pyriformis</i>	-	S	>95%	7.35	-	am	48 h	EC50	1.6		Bryant & Schultz, 1994
bacteriophyta											
Activated sludge bacteria	-	S	-	-	-	-	-	IC50	24	b	Beltrame et al., 1984
<i>Bacillus</i> sp.	-	S	-	7	-	am	30 min	EC50	12	a	Liu et al., 1982
<i>Escherichia coli</i>	-	S	-	-	-	am	12-16 h	EC50	8.3		Nendza & Seydel, 1988
crustacea											
<i>Daphnia magna</i> , 6-24 h	N	S	-	8.0	240	am	24 h	EC50	1.59		Kühn et al., 1989
<i>Daphnia magna</i> , 6-24 h	N	S	-	8.0	240	am	48 h	EC50	0.9		Kühn et al., 1989
<i>Daphnia magna</i> , 24 h	N	S	-	8	250	am	24 h	EC50	1.3		Bringmann & Kühn, 1982
<i>Daphnia magna</i> , < 72 h	-	S	> 95%	8	200	rw	24 h	EC50	2.1		Devillers et al., 1987
<i>Daphnia magna</i>	-	S	-	-	-	-	48 h	EC50	1.2		Knie et al., 1983
<i>Daphnia magna</i> , =< 24 h	-	S	>=80%	8 (7.4-9.4)	160-186	mw	48 h	LC50	2.7		LeBlanc, 1980
pisces											
<i>Brachydanio rerio</i>	-	-	-	-	-	-	24 h	LC50	1.3		Devillers & Chambon, 1986
<i>Lepomis macrochirus</i> , 0.32-1.2 g	-	S	>80%	6.5-7.9	32-48	nw	96 h	LC50	0.45		Buccafusco et al., 1981
<i>Leuciscus idus</i>	-	S	-	-	-	-	96 h	LC50	1		Knie et al., 1983
<i>Pimephales promelas</i>	N	R	99.5	-	44-49	nw	96 h	LC50	0.9		Norberg-King, 1989
<i>Poecilia reticulata</i>	-	S	pure	6	80-100	dtw	96 h	LC50	0.99		Saarikoski & Viluksela, 1981
<i>Poecilia reticulata</i>	-	S	pure	7	80-100	dtw	96 h	LC50	1.2		Saarikoski & Viluksela, 1981
<i>Poecilia reticulata</i>	-	S	pure	8	80-100	dtw	96 h	LC50	3.1		Saarikoski & Viluksela, 1981

a dehydrogenase activity

b inhibition of phenol degradation

Table III. 39: Acute toxicity of 2,4,5-trichlorophenol to marine species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
bacteriophyta											
<i>Vibrio fischeri</i>	-	S	-	-	-	am	15 min	EC50	1.2		Ribo & Kaiser, 1983
algae											
<i>Skeletonema costatum</i>	-	S	-	-	-	-	96 h	EC50	0.99		LeBlanc, 1984
annelida											
<i>Platynereis dumerilii</i> , embryos, < 6h post fertilization	N	S	> 90%	-	350/00	nw	48 h	EC50	2.55	a	Palau-Casellas & Hutchinson, 1998
<i>Platynereis dumerilii</i> , 7-d-old larvae	N	S	> 90%	-	350/00	nw	96 h	LC50	4.24		Palau-Casellas & Hutchinson, 1998
crustacea											
<i>Mysidopsis bahia</i>											
pisces											
<i>Cyprinodon variegatus</i> , 8-15 mm	N	S	-	-	10-310/00	nw	96 h	LC50	3.8		LeBlanc, 1984
a normal embryonal development											Heitmuller et al., 1981

Table III. 40: Chronic toxicity of 2,4,5-trichlorophenol to fresh water species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
pisces											
<i>Pimephales promelas</i> , larvae	N	R	99.5%	-	44-49	nw	7 d	NOEC	0.36	a, b	Norberg-King, 1989

a mortality

b growth

Table III. 41: Toxicity of 2,4,5-trichlorophenol to soil organisms

organism	soil type	pH	% om	% clay	temp [° C]	exp. time	criterion	result test soil [mg/kg _{d.w.}]	result stand. soil [mg/kg _{d.w.}]	note	reference
annelida											
<i>Eisenia andrei</i> , adult	peat	3.8	15.6	9.0	23	14 d	LC50	164	105		Van Gestel & Ma, 1990
<i>Eisenia andrei</i> , adult	artificial soil	6.0	8.1	8.1	23	14 d	LC50	63	78		Van Gestel & Ma, 1990
<i>Eisenia andrei</i> , adult	sand	5.6	6.1	2.4	23	14 d	LC50	76	125		Van Gestel & Ma, 1990
<i>Eisenia andrei</i> , adult	sand	5.0	3.7	1.4	23	14 d	LC50	46	124		Van Gestel & Ma, 1990
<i>Lumbricus rubellus</i> , adult	peat	3.8	15.6	9.0	23	14 d	LC50	875	561		Van Gestel & Ma, 1990
<i>Lumbricus rubellus</i> , adult	artificial soil	6.0	8.1	8.1	23	14 d	LC50	362	447		Van Gestel & Ma, 1990
<i>Lumbricus rubellus</i> , adult	sand	5.6	6.1	2.4	23	14 d	LC50	316	518		Van Gestel & Ma, 1990
<i>Lumbricus rubellus</i> , adult	sand	5.0	3.7	1.4	23	14 d	LC50	235	635		Van Gestel & Ma, 1990

Table III. 42: Acute toxicity of 2,4,6-trichlorophenol to fresh water species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
protozoa											
<i>Tetrahymena pyriformis</i>	-	S	>95%	7.35	-	am	48 h	EC50	4.0		Schultz et al., 1986, 1987
<i>Tetrahymena pyriformis</i>	-	S	-	-	-	am	48 h	EC50	7.7		Cronin & Schultz, 1996
bacteriophyta											
Activated sludge bacteria	-	S	-	-	-	-	-	IC50	42	b	Beltrame et al., 1984
<i>Bacillus</i> sp.	-	S	-	7	-	am	30 min	EC50	240	a	Liu et al., 1982
<i>Escherichia coli</i>	-	S	-	-	-	am	12-16 h	EC50	38		Nendza & Seydel, 1988
<i>Sirochaeta aurantia</i>	-	S	-	7	-	am	30 min	EC50	43		Pill et al., 1991
algae											
<i>Chlorella vulgaris</i>	N	S	rg	7.5	-	am	96 h	EC50	10.0		Shigeoka et al., 1988
<i>Scenedesmus subspicatus</i>	-	S	98%	7	-	am	96 h	EC50	5.6		Geyer et al., 1985
<i>Selenastrum capricornutum</i>	N	S	rg	7.5	-	am	96 h	EC50	3.5		Shigeoka et al., 1988
crustacea											
<i>Daphnia magna</i> , 6-24 h	N	S	-	8.0	240	am	24 h	EC50	3.7		Kühn et al., 1989
<i>Daphnia magna</i> , 6-24 h	N	S	-	8.0	240	am	48 h	EC50	2.2		Kühn et al., 1989
<i>Daphnia magna</i> , < 72 h	-	S	> 95%	8	200	rw	24 h	EC50	5.5		Devillers et al., 1987
<i>Daphnia magna</i> , =< 24 h	-	S	>=80%	8 (7.4-9.4)	160-186	rnw	48 h	LC50	6		LeBlanc, 1980
<i>Daphnia magna</i> , < 24 h	N	S	> 95%	6.5	-	am	48 h	LC50	0.69		Oikari et al., 1992
pisces											
<i>Brachydanio rerio</i>	-	-	-	-	-	-	24 h	LC50	2.5		Devillers & Chambon, 1986
<i>Jordanella floridae</i>	Y	F	-	6.6-7.3	46-50	dtw	96 h	LC50	2.2	α	Smith et al., 1991
<i>Lepomis macrochirus</i> , 1.1 g	Y	F	-	7.2	41-48	nw	96 h	LC50	0.41		Holcombe et al., 1987
<i>Lepomis macrochirus</i> , 0.32-1.2 g	-	S	>80%	6.5-7.9	32-48	nw	96 h	LC50	0.32		Buccafusco et al., 1981
<i>Oncorhynchus mykiss</i> , 13.1 g	Y	F	-	7.2	41-48	nw	96 h	LC50	0.73		Holcombe et al., 1987
<i>Pimephales promelas</i> , 30-35 d	N	F	-			nw		LC50	9.2		Phipps et al., 1981; Hall & Kier, 1984; Hall et al., 1984
<i>Pimephales promelas</i> , 0.3 g	Y	F	-	7.2	41-48	nw	96 h	LC50	2.74		Holcombe et al., 1987
<i>Pimephales promelas</i>	N	F	-	-	-	-	96 h	LC50	9.2		Schultz et al., 1986
<i>Pimephales promelas</i>	-	F	-	-	-	nw	96 h	LC50	4.9		Baerden & Schultz, 1997
<i>Poecilia reticulata</i>	-	S	pure	5	80-100	dtw	96 h	LC50	0.61		Saarikoski & Viluksela, 1981

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
<i>Poecilia reticulata</i>	-	S	pure	6	80-100	dtw	96 h	LC50	0.89		Saarikoski & Viluksela, 1981
<i>Poecilia reticulata</i>	-	S	pure	7	80-100	dtw	96 h	LC50	2.3		Saarikoski & Viluksela, 1981
<i>Poecilia reticulata</i>	-	S	pure	8	80-100	dtw	96 h	LC50	7.9		Saarikoski & Viluksela, 1981

a dehydrogenase activity

b inhibition of phenol degradation

Table III. 43: Acute toxicity of 2,4,6-trichlorophenol to marine species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
bacteriophyta											
<i>Vibrio fisheri</i>	-	S		-		am	15 min	EC50	8.2		Ribo & Kaiser, 1983

Table III. 44: Chronic toxicity of 2,4,6-trichlorophenol to fresh water species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
pisces											
<i>Jordanella floridae</i> , < 24 h eggs	Y	F	-	6.6-7.3	46-50	dnw	15 d	NOEC	0.42	a	Smith et al., 1991
<i>Jordanella floridae</i> , 7 d fry	Y	F	-	6.6-7.3	46-50	dnw	28 d	NOEC	1.01	a	Smith et al., 1991
<i>Jordanella floridae</i> , 7 d fry	Y	F	-	6.6-7.3	46-50	dnw	28 d	NOEC	0.18	b	Smith et al., 1991

a mortality

b growth

Table III. 45: Toxicity of 2,4,6-trichlorophenol to soil organisms

organism	soil type	pH	% om	% clay	temp [° C]	exp. time	criterion	result test soil [mg/kg _{d.w.}]	result stand. soil [mg/kg _{d.w.}]	note	reference
annelida											
<i>Eisenia fetida</i>	artificial soil	6.0	10	20	20	14 d	LC50	58	58		Denneman & Van Gestel, 1990
<i>Allolobophora tuberculata</i>	artificial soil	6.0	10	20	20	14 d	LC50	108	108		Denneman & Van Gestel, 1990
<i>Eudrilus eugeniae</i>	artificial soil	6.0	10	20	20	14 d	LC50	85	85		Denneman & Van Gestel, 1990
<i>Perionyx excavatus</i>	artificial soil	6.0	10	20	20	14 d	LC50	78	78		Denneman & Van Gestel, 1990
macrophyta											
<i>Avena sativa</i>	humic sand	5.1	3.7	-	25	14 d	NOEC	100	270	a	Adema & Henzen, 1989
<i>Avena sativa</i>	loam	7.5	1.4	-	25	14 d	NOEC	100	500	a	Adema & Henzen, 1989
<i>Lactuca sativa</i>	humic sand	5.1	3.7	-	25	14 d	NOEC	32	86	a	Adema & Henzen, 1989
<i>Lactuca sativa</i>	loam	7.5	1.4	-	25	14 d	NOEC	32	160	a	Adema & Henzen, 1989
<i>Lactuca sativa</i>	OECD	7.8	1.4	12	20	14 d	EC50	16	80	a	Hulzebos et al., 1993
<i>Lycopersicum esculentum</i>	humic sand	5.1	3.7	-	25	14 d	NOEC	100	270	a	Adema & Henzen, 1989
<i>Lycopersicum esculentum</i>	loam	7.5	1.4	-	25	14 d	NOEC	100	500	a	Adema & Henzen, 1989

a growth

Table III. 46: Acute toxicity of 3,4,5-trichlorophenol to fresh water species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
bacteriophyta											
Activated sludge bacteria	-	S	-	-	-	-	-	IC50	20	b	Beltrame et al., 1984
<i>Bacillus</i> sp.	-	S	-	7	-	am	30 min	EC50	5	a	Liu et al., 1982
crustacea											
<i>Daphnia magna</i> , < 72 h	-	S	> 95%	8	200	rw	24 h	EC50	0.9		Devillers et al., 1987
pisces											
<i>Brachydanio rerio</i>	-	-	-	-	-	-	24 h	LC50	1.0		Devillers & Chambon, 1986
<i>Poecilia reticulata</i>	-	S	-	7.8	-	-	96 h	LC50	2.4		Könemann & Musch, 1981
<i>Poecilia reticulata</i>	-	S	-	7.3	-	-	96 h	LC50	1.1		Könemann & Musch, 1981
<i>Poecilia reticulata</i>	-	S	-	6.1	-	-	96 h	LC50	1.1		Könemann & Musch, 1981

a dehydrogenase activity

b inhibition of phenol degradation

Table III. 47: Acute toxicity of 3,4,5-trichlorophenol to marine species

organism	A	test type	test subst.	purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
bacteriophyta <i>Vibrio fisheri</i>	-	S	-	-	-	-	am	15 min	EC50	0.38		Ribo & Kaiser, 1983

Table III. 48: Acute toxicity of 2,3,4,5-tetrachlorophenol to fresh water species

organism	A	test type	test subst.	purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
protozoa <i>Tetrahymena pyriformis</i>	-	S	-	>95%	7.35	-	am	48 h	EC50	0.45		Bryant & Schultz, 1994
bacteriophyta Activated sludge bacteria	-	S	-	-	-	-	-	-	IC50	20	b	Beltrame et al., 1984
<i>Bacillus</i> sp.	-	S	-	-	7	-	am	30 min	EC50	4	a	Liu et al., 1982
<i>Escherichia coli</i>	-	S	-	-	-	-	am	12-16 h	EC50	10		Nendza & Seydel, 1988
crustacea <i>Daphnia magna</i> , < 72 h	-	S	-	> 95%	8	200	rw	24 h	EC50	1.8		Devillers et al., 1987
pisces <i>Brachydanio rerio</i>	-	-	-	-	-	-	-	24 h	LC50	0.88		Devillers & Chambon, 1986
<i>Pimephales promelas</i> , 30-35 d	N	F	-	-	-	-	nw	24 h	LC50	0.44		Hall & Kier, 1984; Hall et al., 1984
<i>Pimephales promelas</i>	N	F	-	-	-	-	-	96 h	LC50	0.4		Schultz et al., 1986
<i>Pimephales promelas</i>	Y	S	97%	-	7.3	45.1	nw	96 h	LC50	0.41		Geiger et al., 1985
<i>Poecilia reticulata</i>	-	S	-	-	7.8	-	-	96 h	LC50	2.3		Könemann & Musch, 1981
<i>Poecilia reticulata</i>	-	S	-	-	7.3	-	-	96 h	LC50	0.8		Könemann & Musch, 1981
<i>Poecilia reticulata</i>	-	S	-	-	6.1	-	-	96 h	LC50	0.4		Könemann & Musch, 1981

a dehydrogenase activity

b inhibition of phenol degradation

Table III. 49: Acute toxicity of 2,3,4,5-tetrachlorophenol to marine species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
bacteriophyta <i>Vibrio fischeri</i>	-	S	-	-	-	am	15 min	EC50	0.21		Ribo & Kaiser, 1983

Table III. 50: Toxicity of 2,3,4,5-tetrachlorophenol to soil organisms

organism	soil type	pH	% om	% clay	temp [° C]	exp. time	criterion	result test soil [mg/kg _{d.w.}]	result stand. soil [mg/kg _{d.w.}]	note	reference
annelida											
<i>Eisenia andrei</i> , adult	sand	5.6	6.1	2.4	23	14 d	LC50	166	272		Van Gestel & Ma, 1990
<i>Eisenia andrei</i> , adult	sand	5.0	3.7	1.4	23	14 d	LC50	117	316		Van Gestel & Ma, 1990
<i>Lumbricus rubellus</i> , adult	sand	5.6	6.1	2.4	23	14 d	LC50	875	1434		Van Gestel & Ma, 1990
<i>Lumbricus rubellus</i> , adult	sand	5.0	3.7	1.4	23	14 d	LC50	515	1392		Van Gestel & Ma, 1990

Table III. 51: Acute toxicity of 2,3,4,6-tetrachlorophenol to fresh water species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
bacteriophyta											
Activated sludge bacteria	-	S	-	-	-	-	-	IC50	40	a	Beltrame et al., 1984
protozoa											
<i>Tetrahymena pyriformis</i>	-	S	-	-	-	am	48 h	EC50	1.4		Baerden & Schultz, 1997
rotifera											
<i>Brachionus calyciflorus</i>	N	S	95%	7.9	374	nw	24 h	LC50	5.19	b	Liber & Solomon, 1994
<i>Brachionus calyciflorus</i>	N	S	95%	-	-	nw	24 h	LC50	5.19	c	Liber & Solomon, 1994
<i>Keratella cochlearis</i>	N	S	95%	7.9	374	nw	12 h	LC50	0.96		Liber & Solomon, 1994
algae											
<i>Chlorella vulgaris</i>	N	S	rg	7.5	-	am	96 h	EC50	10.1		Shigeoka et al., 1988
<i>Selenastrum capricornutum</i>	N	S	rg	7.5	-	am	96 h	EC50	1.3		Shigeoka et al., 1988
crustacea											
<i>Daphnia galeata mendotae</i>	N	S	95%	7.9	374	nw	48 h	LC50	0.58		Liber & Solomon, 1994
<i>Daphnia magna</i>	N	S	95%	7.9	374	nw	48 h	LC50	2.66		Liber & Solomon, 1994
<i>Daphnia magna</i> , =< 24 h	-	S	>=80%	8 (7.4-9.4)	160-186	nw	48 h	LC50	0.29		LeBlanc, 1980
<i>Daphnia magna</i> , < 24 h	N	S	> 95%	6.5	-	am	48 h	LC50	0.18		Oikari et al, 1992
pisces											
<i>Lepomis macrochirus</i> , 0.32-1.2 g	-	S	>80%	6.5-7.9	32-48	nw	96 h	LC50	0.14		Buccafusco et al., 1981
<i>Pimephales promelas</i>	-	F	-	-	-	nw	96 h	LC50	1.04		Baerden & Schultz, 1997
<i>Poecilia reticulata</i>	-	S	pure	6	80-100	dtw	96 h	LC50	0.34		Saarikoski & Viluksela, 1981
<i>Poecilia reticulata</i>	-	S	pure	7	80-100	dtw	96 h	LC50	1.1		Saarikoski & Viluksela, 1981
<i>Poecilia reticulata</i>	-	S	pure	8	80-100	dtw	96 h	LC50	3.7		Saarikoski & Viluksela, 1981

a inhibition of phenol degradation

b 100% well water

c 33% well water and 67% distilled water

Table III. 52: Acute toxicity of 2,3,4,6-tetrachlorophenol to marine species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
bacteriophyta											
<i>Vibrio fischeri</i>	-	S	-	-	-	am	15 min	EC50	1.5		Ribo & Kaiser, 1983
crustacea											
<i>Crangon septemspinosa</i> , 2.4-4.5 g	N	S	-	-	30 o/oo	nw	96 h	LC50	11.8		McLeese et al., 1979

Table III. 53: Acute toxicity of 2,3,5,6-tetrachlorophenol to fresh water species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
protozoa											
<i>Tetrahymena pyriformis</i>	-	S	>95%	7.35	-	am	48 h	EC50	1.4		Bryant & Schultz, 1994
bacteriophyta											
Activated sludge bacteria	-	S	-	-	-	-	-	IC50	44	a	Beltrame et al., 1984
<i>Bacillus</i> sp.	-	S	-	7	-	am	30 min	EC50	54	b	Liu et al., 1982
crustacea											
<i>Daphnia magna</i> , < 72 h	-	S	> 95%	8	200	rw	24 h	EC50	2.3		Devillers et al., 1987
<i>Daphnia magna</i> , =< 24 h	-	S	>=80%	8 (7.4-9.4)	160-186	rnw	48 h	LC50	0.57		LeBlanc, 1980
pisces											
<i>Brachydanio rerio</i>	-	-	-	-	-	-	24 h	LC50	3.6		Devillers & Chambon, 1986
<i>Jordanella floridae</i>	Y	F	-	6.6-7.3	46-50	dtw	96 h	LC50	1.16		Smith et al., 1991
<i>Lepomis macrochirus</i> , 0.32-1.2 g	-	S	>80%	6.5-7.9	32-48	nw	96 h	LC50	0.17	α	Buccafusco et al., 1981
<i>Poecilia reticulata</i>	-	S	-	7.8	-	-	96 h	LC50	3.9		Könemann & Musch, 1981
<i>Poecilia reticulata</i>	-	S	-	7.3	-	-	96 h	LC50	1.4		Könemann & Musch, 1981
<i>Poecilia reticulata</i>	-	S	-	6.1	-	-	96 h	LC50	0.4		Könemann & Musch, 1981

a inhibition of phenol degradation

b dehydrogenase activity

Table III. 54: Acute toxicity of 2,3,5,6-tetrachlorophenol to marine species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
bacteriophyta <i>Vibrio fisheri</i>	-	S	-	-	-	am	15 min	EC50	2.5		Ribo & Kaiser, 1983
pisces <i>Cyprinodon variegatus</i> , 8-15 mm	N	S	-	-	10-31 o/oo	nw	96 h	LC50	1.9		Heitmuller et al., 1981

Table III. 55: Chronic toxicity of 2,3,5,6-tetrachlorophenol to fresh water species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
pisces <i>Jordanella floridae</i> , < 24 h eggs	Y	F	-	6.6-7.3	46-50	dnw	15 d	NOEC	0.21	a	Smith et al., 1991
<i>Jordanella floridae</i> , < 24 h eggs	Y	F	-	6.6-7.3	46-50	dnw	5 d	NOEC	0.57	b	Smith et al., 1991
<i>Jordanella floridae</i> , 7 d fry	Y	F	-	6.6-7.3	46-50	dnw	28 d	NOEC	0.095	a	Smith et al., 1991

a mortality

b hatchability

Table III. 56: Acute toxicity of pentachlorophenol to fresh water species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
protozoa											
<i>Tetrahymena pyriformis</i>	-	S	>95%	7.35	-	am	48 h	EC50	0.80		Bryant & Schultz, 1994
<i>Tetrahymena pyriformis</i>	-	S	-	-	-	am	48 h	EC50	2.4		Cronin & Schultz, 1996
<i>Tetrahymena pyriformis</i>	N	S	ag	-	-	am	48 h	EC50	0.25		Schäfer et al., 1994
<i>Tetrahymena pyriformis</i>	N	S	ag	-	-	am	48 h	EC50	0.64		Schäfer et al., 1994
rotifera											
<i>Brachionus calyciflorus</i>	N	S	ag	-	-	am	24 h	LC50	1.41		Crisinel et al., 1994
<i>Brachionus calyciflorus</i> , cysts	N	S	ag	7.8	90	am	24 h	LC50	1.2		Ferrando et al., 1992
<i>Brachionus calyciflorus</i> , cysts	N	S	ag	7.8	90	am	5 h	EC50	1.85		Ferrando et al., 1992
<i>Brachionus calyciflorus</i> , neonate	N	S	99%	7.9	374	nw	24 h	LC50	2.66	d	Liber & Solomon, 1994
<i>Brachionus calyciflorus</i> , neonate	N	S	99%	7.9	374	nw	24 h	LC50	7.76	d	Liber & Solomon, 1994
<i>Brachionus calyciflorus</i> , adult	N	S	99%	7.9	374	nw	24 h	LC50	2.09	d	Liber & Solomon, 1994
<i>Brachionus calyciflorus</i> , adult	N	S	99%	7.9	374	nw	24 h	LC50	3.34	d	Liber & Solomon, 1994
bacteriophyta											
Activated sludge bacteria	-	S	-	7.5	-	am	6 h	IC50	2.5		Klecka & Landi, 1985
Activated sludge bacteria	-	S	-	-	-	-	-	IC50	23	e	Beltrame et al., 1984
<i>Bacillus</i> sp.	-	S	-	7	-	am	30 min	EC50	9	c	Liu et al., 1982
<i>Rhizobium meliloti</i>	-	S	-	7.5	-	am	20 min	EC50	0.4		Botsford et al., 1997
<i>Escherichia coli</i>	-	S	-	-	-	am	12-16 h	EC50	32		Nendza & Seydel, 1988
<i>Salmonella typhimurium</i>	-	S	-	7	-	am	30 min	EC50	2.7		Pill et al., 1991
<i>Sirochaeta aurantia</i>	-	S	-	7	-	am	30 min	EC50	2.5		Pill et al., 1991
algae											
<i>Chlamydomonas reinhardtii</i>	N	S	ag	-	-	am	72 h	EC50	0.22		Schäfer et al., 1994
<i>Chlorella pyrenoidosa</i>	Y	S	pure	8	-	am	96 h	EC50	7.0		Adema & Vink, 1981
<i>Chlorella vulgaris</i>	N	S	rg	7.5	-	am	96 h	EC50	10.3		Shigeoka et al., 1988
<i>Scenedesmus quadricauda</i>	Y	S	pure	8	-	am	96 h	EC50	0.08		Adema & Vink, 1981
<i>Scenedesmus subspicatus</i>	-	S	99%	7	-	am	96 h	EC50	0.09		Geyer et al., 1985
<i>Scenedesmus subspicatus</i>	N	S	ag	-	-	am	72 h	EC50	0.183		Schäfer et al., 1994
<i>Selenastrum capricornutum</i>	N	S	rg	7.5	-	am	96 h	EC50	0.42		Shigeoka et al., 1988

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
annelida											
<i>Dugesia cf. lugubris</i>	N	S	>98%	8.2	200	am	48 h	LC50	0.13		Slooff, 1983
<i>Erpobdella octoculata</i>	N	S	>98%	8.2	200	am	48 h	LC50	0.25		Slooff, 1983
<i>Lumbriculus variegatus</i>	N	S	-	7.6	10	nw	96 h	EC50	0.69		Hickey & Martin, 1995
Tubificidae	N	S	>98%	8.2	200	am	48 h	LC50	1.0		Slooff, 1983
insecta											
<i>Chironomus gr. thummi</i>	N	S	>98%	8.2	200	am	48 h	LC50	0.11		Slooff, 1983
<i>Cloëon dipterum</i>	N	S	>98%	8.2	200	am	48 h	LC50	5.9		Slooff, 1983
<i>Corixa punctata</i>	N	S	>98%	8.2	200	am	48 h	LC50	11		Slooff, 1983
<i>Ischnura elegans</i>	N	S	>98%	8.2	200	am	48 h	LC50	42		Slooff, 1983
<i>Nemoura cinerea</i>	N	S	>98%	8.2	200	am	48 h	LC50	0.38		Slooff, 1983
crustacea											
<i>Asellus aquaticus</i>	N	S	>98%	8.2	200	am	48 h	LC50	2.9		Slooff, 1983
<i>Chaetocorophium c.f. lucasi</i>	N	S	-	7.6	10	nw	96 h	EC50	0.13		Hickey & Martin, 1995
<i>Cypris subglobosa</i> , 0.67 mm	-	S	rg	7.9	204	dtw	96 h	LC50	6.6		Rao et al., 1983
<i>Daphnia magna</i> , < 24 h	-	S	rg	7.6	-	am	24 h	EC50	0.86		Lilius et al., 1994
<i>Daphnia cucullata</i> , 11 d	N	S	≥98%	7.9	100	am	48 h	LC50	1.5		Canton & Adema, 1978
<i>Daphnia magna</i> , < 1 d	N	S	≥98%	7.9	100	am	48 h	LC50	0.25	b	Canton & Adema, 1978
<i>Daphnia magna</i> , < 1 d	N	S	≥98%	7.9	100	am	48 h	LC50	0.40	b	Canton & Adema, 1978
<i>Daphnia magna</i> , < 1 d	N	S	≥98%	7.9	100	am	48 h	LC50	0.80	b	Canton & Adema, 1978
<i>Daphnia magna</i> , 6-24 h	N	S	-	8.0	240	am	24 h	EC50	0.67		Kühn et al., 1989
<i>Daphnia magna</i> , 6-24 h	N	S	-	8.0	240	am	48 h	EC50	0.55		Kühn et al., 1989
<i>Daphnia magna</i> , larvae, 1mm	Y	S	pure	8	-	hard	48 h	LC50	1.05		Adema & Vink, 1981
<i>Daphnia magna</i> , adult 3 mm	Y	S	pure	8	-	hard	48 h	LC50	1.40		Adema & Vink, 1981
<i>Daphnia magna</i> , < 24 h	-	S	-	7.0-8.2	154.5	-	48 h	LC50	0.95		Randall & Knopp, 1980
<i>Daphnia magna</i> , 24 h	N	S	-	8	250	am	24 h	LC50	0.8		Bringmann & Kühn, 1982
<i>Daphnia magna</i> , < 72 h	-	S	>95%	8	200	rw	24 h	EC50	0.75		Devillers et al., 1987
<i>Daphnia magna</i> , =< 24 h	-	S	≥80%	8 (7.4-9.4)	160-186	rnw	48 h	LC50	0.68		LeBlanc, 1980
<i>Daphnia magna</i> , < 24 h	-	S	ag	7.8-8.2	250	rhw	48 h	EC50	0.37		Berglind & Dave, 1984
<i>Daphnia magna</i> , < 24 h	-	S	ag	7.8-8.2	250	rhw	48 h	EC50	0.44		Berglind & Dave, 1984
<i>Daphnia magna</i> , < 24 h	N	S	>95%	6.5	-	am	48 h	LC50	0.055		Oikari et al, 1992
<i>Daphnia pulex</i> , < 24 h	N	S	≥98%	7.9	100	am	48 h	LC50	2.0		Canton & Adema, 1978

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
<i>Gammarus pulex</i>	N	S	>98%	8.2	200	am	48 h	LC50	0.7		Slooff, 1983
<i>Streptocephalus rubricaudatus</i> , cyst	N	S	ag	-	-	am	24 h	LC50	0.43		Crisinel et al., 1994
<i>Streptocephalus texanus</i> , cyst	N	S	ag	-	-	am	24 h	LC50	1.04		Crisinel et al., 1994
mollusca											
<i>Dreissenia polymorpha</i> , adult, 2cm	Y	S	pure	8	-	soft	96 h	LC50	0.11		Adema & Vink, 1981
<i>Dreissenia polymorpha</i> , adult 2 cm	Y	S	pure	8	-	hard	96 h	LC50	0.19		Adema & Vink, 1981
<i>Indoplanorbis exustus</i> (Na-PCP)	-	S	-	-	-	nw	96 h	LC50	0.18		Agrawal, 1987
<i>Lymnaea acuminata</i>	-	S	-	7.9	210	nw	96 h	LC50	0.104		Gupta & Rao, 1982
<i>Lymnaea stagnalis</i> , eggs	Y	S	pure	8	-	hard	96 h	LC50	0.24		Adema & Vink, 1981
<i>Lymnaea stagnalis</i>	N	S	>98%	8.2	200	am	48 h	LC50	0.56		Slooff, 1983
<i>Spearium novaezelandiae</i>	N	S	-	7.6	10	nw	96 h	EC50	1.1		Hickey & Martin, 1995
coelenterata											
<i>Hydro oligactis</i>	N	S	>98%	8.2	200	am	48 h	LC50	0.73		Slooff, 1983
pisces											
<i>Brachydanio rerio</i>	-	-	-	-	-	-	24 h	LC50	0.79		Devillers & Chambon, 1986
<i>Brachydanio rerio</i>	N	F	-	8.0	170	dtw	48 h	LC50	0.4		Slooff, 1979
<i>Brachydanio rerio</i>	N	S	-	7.5	-	-	96 h	LC50	0.45		Wellens, 1982
<i>Colisa fasciatus</i>	-	S	tech	6.8-7.6	66	tw	96 h	LC50	0.45		Verma et al., 1980
<i>Jordanella floridae</i>	Y	F	-	6.6-7.3	46-50	dtw	96 h	LC50	0.22	α	Smith et al., 1991
<i>Lebistes reticulatus</i> , 0.09 g	N	S	-	7.9	228	-	96 h	LC50	0.97		Gupta et al., 1982
<i>Leuciscus idus</i>	-	S	-	-	-	-	96 h	LC50	0.1		Knie et al., 1983
<i>Notopterus notopterus</i>	-	S	tech	6.8-7.6	66	tw	96 h	LC50	0.083		Verma et al., 1980
<i>Oncorhynchus mykiss</i>	-	S	92%	-	-	-	96 h	LC50	0.052		Little et al., 1990 (cited)
<i>Oncorhynchus mykiss</i>	Y	F	rg	-	-	dtw	96 h	LC50	0.16	α	Hodson et al., 1984
<i>Oncorhynchus mykiss</i> , egg-0 h	N	S	97%	7.2	50	dsw	96 h	LC50	3.0		van Leeuwen et al., 1985
<i>Oncorhynchus mykiss</i> , egg-24 h	N	S	97%	7.2	50	dsw	96 h	LC50	1.3		van Leeuwen et al., 1985
<i>Oncorhynchus mykiss</i> , 14 d eyed egg	N	S	97%	7.2	50	dsw	96 h	LC50	3.0		van Leeuwen et al., 1985
<i>Oncorhynchus mykiss</i> , 28 d eyed egg	N	S	97%	7.2	50	dsw	96 h	LC50	0.48		van Leeuwen et al., 1985
<i>Oncorhynchus mykiss</i> , sac fry 42 d	N	S	97%	7.2	50	dsw	96 h	LC50	0.032		van Leeuwen et al., 1985
<i>Oncorhynchus mykiss</i> , early fry 77 d	N	S	97%	7.2	50	dsw	96 h	LC50	0.018		van Leeuwen et al., 1985
<i>Pimephales promelas</i> , 30-35 d	N	F	-	-	-	nw	48 h	LC50	0.23		Hall & Kier, 1984; Hall et al., 1984
<i>Pimephales promelas</i> , 5g	-	R	-	-	-	-	48 h	LC50	0.3	a	Zhao & Wang, 1993

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
<i>Pimephales promelas</i> , 30-35 d	-	F	-	7.2	43.3-48.5	nw	96 h	LC50	0.22		Phipps et al., 1981
<i>Pimephales promelas</i>	Y	S	97%	7.8	48	nw	96 h	LC50	0.24		Geiger et al., 1985
<i>Poecilia reticulata</i>	N	S	-	-	-	-	96 h	LC50	0.44		Shigeoka et al., 1988
<i>Poecilia reticulata</i> , young, bought	Y	S	pure	8	-	hard	96 h	LC50	0.72		Adema & Vink, 1981
<i>Poecilia reticulata</i> , young, lab.cult	Y	S	pure	8	-	hard	96 h	LC50	0.88		Adema & Vink, 1981
<i>Poecilia reticulata</i> , adult, bought	Y	S	pure	8	-	hard	96 h	LC50	0.45		Adema & Vink, 1981
<i>Poecilia reticulata</i>	-	S	-	7.8	-	-	96 h	LC50	0.8		Könemann & Musch, 1981
<i>Poecilia reticulata</i>	-	S	-	7.3	-	-	96 h	LC50	0.4		Könemann & Musch, 1981
<i>Poecilia reticulata</i>	-	S	-	6.1	-	-	96 h	LC50	0.1		Könemann & Musch, 1981
<i>Poecilia reticulata</i>	-	S	pure	5	80-100	dtw	96 h	LC50	0.04		Saarikoski & Viluksela, 1981
<i>Poecilia reticulata</i>	-	S	pure	6	80-100	dtw	96 h	LC50	0.12		Saarikoski & Viluksela, 1981
<i>Poecilia reticulata</i>	-	S	pure	7	80-100	dtw	96 h	LC50	0.44		Saarikoski & Viluksela, 1981
<i>Poecilia reticulata</i>	-	S	pure	8	80-100	dtw	96 h	LC50	0.91		Saarikoski & Viluksela, 1981
<i>Saccobranchus fossiliss</i>	-	S	tech	6.8-7.6	66	tw	96 h	LC50	0.29		Verma et al., 1980
amphibia											
<i>Ambystoma mexicanum</i> , 3-4 w after hatching	-	S	-	8.2	200	DSW	48 h	LC50	0.30		Slooff & Baerselman, 1980
<i>Xenopus laevis</i> , 3-4 w after hatching	-	S	-	8.2	200	DSW	48 h	LC50	0.26		Slooff & Baerselman, 1980

a calculated by QSAR

b 3 different experiments performed in 2 different laboratoria

c dehydrogenase activity

d 2 different sources of cysts

e inhibition of phenol degradation

Table III. 57: Acute toxicity of pentachlorophenol to marine species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
bacteriophyta											
<i>Vibrio fischeri</i>	-	S	-	-	-	am	15 min	EC50	0.5		Zhao & Wang, 1993
<i>Vibrio fischeri</i>	-	S	-	-	-	am	15 min	EC50	0.61		Ribo & Kaiser, 1983
<i>Vibrio fischeri</i>	N	S	ag	-	-	am	15 min	EC50	0.84		Crisinel et al., 1994
algae											
<i>Chlamydomonas</i> sp.	Y	S	pure	8	-	es	96 h	EC50	1.4	a, b	Adema & Vink, 1981
<i>Chlorella ovalis</i>	Y	S	pure	8	-	es	96 h	EC50	5.5	a, b	Adema & Vink, 1981
<i>Dunaliella</i> sp.	Y	S	pure	8	-	es	96 h	EC50	3.6	a, b	Adema & Vink, 1981
<i>Monohrysia</i> sp.	Y	S	pure	8	-	es	96 h	EC50	0.2	a, b	Adema & Vink, 1981
<i>Phaeodactylum tricornutum</i>	Y	S	pure	8	-	es	96 h	EC50	3.0	a, b	Adema & Vink, 1981
crustacea											
<i>Artemia salina</i> , cysts	N	S	ag	-	35 o/oo	rhw	24 h	LC50	3.9	c	Crisinel et al., 1994
<i>Artemia salina</i> , larvae, 3d	Y	S	pure	8	-	am	96 h	LC50	4.6		Adema & Vink, 1981
<i>Artemia salina</i> , adult, 1cm	Y	S	pure	8	-	am	96 h	LC50	16		Adema & Vink, 1981
<i>Chaetogammarus marinus</i> , larvae	Y	S	pure	8	-	am	96 h	LC50	0.55		Adema & Vink, 1981
<i>Chaetogammarus marinus</i> , adult	Y	S	pure	8	-	am	96 h	LC50	0.45		Adema & Vink, 1981
<i>Crangon crangon</i> , adult 4 cm	Y	S	pure	8	-	am	96 h	LC50	10		Adema & Vink, 1981
<i>Crangon septemspinosa</i> , 2.4-4.5 g	N	S	-	-	30 o/oo	nw	66 h	LC50	3.3		McLeese et al., 1979
<i>Palaemonetes varians</i> , adult 4 cm	Y	S	pure	8	-	am	96 h	LC50	7.5		Adema & Vink, 1981
<i>Temora longicornis</i> , adult 1 mm	Y	S	pure	8	-	am	96 h	LC50	0.17		Adema & Vink, 1981
mollusca											
<i>Crepidula fornicata</i> , larvae	Y	S	pure	8	-	nw	48 h	LC50	1.20		Adema & Vink, 1981
<i>Mytilus edulis</i> , adult, 2 cm	Y	S	pure	8	-	nw	96 h	LC50	18		Adema & Vink, 1981
annelida											
<i>Ophryotrocha diadema</i> , larvae, 3 d	Y	S	pure	8	33 o/oo	am	96 h	LC50	0.62		Adema & Vink, 1981
<i>Ophryotrocha diadema</i> , adult 4w	Y	S	pure	8	33 o/oo	am	96 h	LC50	1.20		Adema & Vink, 1981
pisces											
<i>Cyprinodon variegatus</i>	-	F	-	-	-	-	96 h	LC50	0.44		Parrish et al., 1978
<i>Gobius minutus</i> , adult	Y	S	pure	8	-	nw	48 h	LC50	0.45		Adema & Vink, 1981
<i>Pleuronectes platessa</i> , yolk-sac larva	Y	S	pure	8	-	am	96 h	LC50	0.14		Adema & Vink, 1981
<i>Pleuronectes platessa</i> , larva, stage 3	Y	S	pure	8	-	am	96 h	LC50	0.06		Adema & Vink, 1981

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
<i>Pleuronectes platessa</i> , juv. 4.5-8 cm	Y	S	pure	8	-	nw	96 h	LC50	0.14		Adema & Vink, 1981
<i>Pleuronectes platessa</i> , ~ 10cm	Y	S	pure	8	-	nw	96 h	LC50	0.17		Adema & Vink, 1981
<i>Pleuronectes platessa</i> , ~20 cm	Y	S	pure	8	-	nw	96 h	LC50	0.15		Adema & Vink, 1981
<i>Pleuronectes platessa</i> , egg	Y	S	pure	8	-	am	96 h	LC50	0.75		Adema & Vink, 1981
<i>Poecilia reticulata</i> , young, lab.cult	Y	S	pure	8	-	nw	96 h	LC50	1.60		Adema & Vink, 1981
<i>Poecilia reticulata</i> , adult, bought	Y	S	pure	8	-	nw	96 h	LC50	1.15		Adema & Vink, 1981

a growth

b es: enriched seawater

c rhw: reconstituted hard water

Table III. 58: Chronic toxicity of pentachlorophenol to fresh water species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
bacteriophyta											
<i>Pseudomonas fluorescens</i>	N	S	-	-	81	am	7 h	NOEC	1	d	Slooff & Canton, 1983
protozoa											
<i>Tetrahymena pyriformis</i>	N	S	ag	-	-	am	48 h	NOEC	0.08	d	Schäfer et al., 1994
<i>Tetrahymena pyriformis</i>	N	S	ag	-	-	am	96 h	NOEC	0.1	d	Schäfer et al., 1994
rotatoria											
<i>Brachionus calyciflorus</i>	Y	R	ag	-	100	am	96 h	NOEC	0.2	f	Janssen et al., 1994
cyanophyta											
<i>Microcystis aeruginosa</i>	N	S	-	-	24	am	4 d	NOEC	1	d	Slooff & Canton, 1983
algae											
<i>Chlamydomonas reinhardi</i>	N	S	ag	-	-	am	72 h	NOEC	0.03	d	Schäfer et al., 1994
<i>Chlamydomonas reinhardi</i>	N	S	ag	-	-	am	24 h	NOEC	0.09	g	Schäfer et al., 1994
<i>Chlamydomonas reinhardi</i>	Y	F	ag	-	-	am	4 d	NOEC	0.3	d	Schäfer et al., 1994
<i>Chlamydomonas reinhardi</i>	Y	F	ag	-	-	am	7 d	NOEC	0.36	d	Schäfer et al., 1994
<i>Chlamydomonas reinhardi</i>	Y	F	ag	-	-	am	10 d	NOEC	0.36	d	Schäfer et al., 1994
<i>Scenedesmus pannonicus</i>	N	S	-	-	54	am	4 d	NOEC	0.1	d	Slooff & Canton, 1983
<i>Scenedesmus subspicatus</i>	N	S	ag	-	-	am	72 h	NOEC	0.135	d	Schäfer et al., 1994
<i>Scenedesmus subspicatus</i>	N	S	ag	-	-	am	24 h	NOEC	0.14	g	Schäfer et al., 1994
macrophyta											
<i>Lemna minor</i>	N	S	-	-	268	am	7 d	NOEC	1	d	Slooff & Canton, 1983
crustacea											
<i>Daphnia magna</i> , 1 d	Y	R	-	7.9	100	am	21 d	NOEC	0.18	a	Adema, 1978
<i>Daphnia magna</i> , 1 d	Y	R	-	7.9	100	am	21 d	NOEC	0.32	b	Adema, 1978
<i>Daphnia magna</i> , 1 d	N	R	-	8.2	200	am	21 d	NOEC	0.1	a, b	Slooff & Canton, 1983
insecta											
<i>Culex pipiens</i> , 1st instar	N	R	-	8.2	200	am	25 d	NOEC	3.2	a, e	Slooff & Canton, 1983
coelenterata											
<i>Hydra oligactis</i>	N	R	-	8.2	200	am	21 d	NOEC	0.032	d	Slooff & Canton, 1983
mollusca											
<i>Lymnaea stagnalis</i> , eggs	Y	S	pure	8	hard	-	16 d	NOEC	0.05	c	Adema & Vink, 1981

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
<i>Lymnea stagnalis</i> , 5 m	N	R	-	8.2	200	am	40 d	NOEC	0.1	a	Slooff & Canton, 1983
<i>Lymnea stagnalis</i> , 5 m	N	R	-	8.2	200	am	40 d	NOEC	0.01	b	Slooff & Canton, 1983
<i>Lymnea stagnalis</i> , eggs	N	R	-	8.2	200	am	7 d	NOEC	0.0032	c	Slooff & Canton, 1983
pisces											
<i>Jordanella floridae</i> , < 24 h eggs	Y	F	-	6.6-7.3	46-50	dnw	15 d	NOEC	0.055	a	Smith et al., 1991
<i>Jordanella floridae</i> , < 24 h eggs	Y	F	-	6.6-7.3	46-50	dnw	5 d	NOEC	0.10	c	Smith et al., 1991
<i>Jordanella floridae</i> , 7 d fry	Y	F	-	6.6-7.3	46-50	dnw	28 d	NOEC	0.10	a	Smith et al., 1991
<i>Oryzias latipes</i> , eggs	N	R	-	8.2	200	am	40 d	NOEC	0.032	a	Slooff & Canton, 1983
<i>Oryzias latipes</i> , eggs	N	R	-	8.2	200	am	40 d	NOEC	0.32	c, d	Slooff & Canton, 1983
<i>Poecilia reticulata</i> , 3-4 w	N	R	-	8.2	200	am	28 d	NOEC	0.32	a	Slooff & Canton, 1983
<i>Poecilia reticulata</i> , 3-4 w	N	R	-	8.2	200	am	28 d	NOEC	0.10	d	Slooff & Canton, 1983
amphibia											
<i>Xenopus laevis</i> , < 2 d	N	R	-	8.2	200	am	100 d	NOEC	0.032	a, d, e	Slooff & Canton, 1983

a mortality

b reproduction

c hatchability

d growth

e development

f intrinsic rate of natural increase

g effective photosynthesis rate

Table III. 59: Chronic toxicity of pentachlorophenol to marine species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
crustacea											
<i>Artemia salina</i> , larvae, 3 d	Y	S	pure	8	-	am	28 d	NOEC	5.8	b	Adema & Vink, 1981
<i>Chaetogammarus marinus</i> , larvae	Y	S	pure	8	-	am	8 w	NOEC	0.10	c	Adema & Vink, 1981
annelida											
<i>Ophryotrocha diadema</i> , larvae, 3 d	Y	R	pure	8	33	am	48 d	NOEC	0.03	a, e	Hoofman & Vink, 1980
<i>Ophryotrocha diadema</i> , larvae, 3 d	Y	R	pure	8	33	am	48 d	NOEC	0.1	d, g	Hoofman & Vink, 1980
<i>Ophryotrocha diadema</i> , larvae, 3 d	Y	R	pure	8	33	am	48 d	NOEC	0.003	f	Hoofman & Vink, 1980
<i>Ophryotrocha diadema</i> , adult 4w	Y	R	pure	8	33	am	37 d	NOEC	0.1	a	Hoofman & Vink, 1980
<i>Ophryotrocha diadema</i> , adult 4w	Y	R	pure	8	33	am	37 d	NOEC	0.03	d	Hoofman & Vink, 1980
<i>Ophryotrocha diadema</i> , adult 4w	Y	R	pure	8	33	am	37 d	NOEC	0.01	f	Hoofman & Vink, 1980
pisces											
<i>Pleuronecta platessa</i> , eggs	Y	S	pure	8	-	nw	60 d	NOEC	<0.18	c	Adema & Vink, 1981
<i>Poecilia reticulata</i> , young	Y	S	pure	8	-	am	8 w	NOEC	0.010	a, c	Adema & Vink, 1981

a mortality

b reproduction inhibition

c growth

d mean number of egg masses per animal

e mean number of larvae per egg mass

f mortality in egg mass, reproductive potential

g mean number of eggs per egg mass

Table III. 60: Acute toxicity of pentachlorophenol to soil organisms

organism	soil type	pH	% om	% clay	temp [° C]	exp. time	criterion	result test soil [mg/kg _{d.w.}]	result stand. soil [mg/kg _{d.w.}]	note	reference
macrophyta											
<i>Lactuca sativa</i>	OECD	7.8	1.4	12	20	14 d	EC50	3.2	16	a	Hulzebos et al., 1993
<i>Lactuca sativa</i>	loam	7.5	2.0	15.0	22	14 d	EC50	8	40	a	Van Gestel et al., 1996
<i>Lactuca sativa</i>	artificial soil	6.2	8.1	8.1	22	14 d	EC50	3	3.7	a	Van Gestel et al., 1996
annelida											
<i>Eisenia andrei</i> , adult	peat	3.8	15.6	9.0	23	14 d	LC50	502	322		Van Gestel & Ma, 1990
<i>Eisenia andrei</i> , adult	artificial soil	6.0	8.1	8.1	23	14 d	LC50	83	102		Van Gestel & Ma, 1990
<i>Eisenia andrei</i> , adult	sand	5.6	6.1	2.4	23	14 d	LC50	142	233		Van Gestel & Ma, 1990
<i>Eisenia andrei</i> , adult	sand	5.0	3.7	1.4	23	14 d	LC50	84	227		Van Gestel & Ma, 1990
<i>Eisenia fetida</i>	artificial soil	7.0	10	5	22	28 d	LC50	87	87		Heimbach, 1984
<i>Eisenia fetida andrei</i> , > 6 w	artificial soil	7.0	7.7	10.4	23	14 d	LC50	28.5	37		Van Gestel & van Dis, 1988
<i>Eisenia fetida andrei</i> , > 6 w	sand	7.0	1.7	4.3	23	14 d	LC50	16	80		Van Gestel & van Dis, 1988
<i>Eisenia fetida andrei</i> , > 6 w	sand	4.1	1.7	4.3	23	14 d	LC50	52	260		Van Gestel & van Dis, 1988
<i>Eisenia andrei</i> , juvenile	artificial soil	6.0	10	20	20	35 d	LC50	28	28		Van Gestel et al., 1991
<i>Eisenia andrei</i> , adult	artificial soil	6.0	10	20	20	35 d	LC50	72	72		Van Gestel et al., 1991
<i>Enchytraeus albidus</i>	artificial soil	6.5	10	20	12	28 d	LC50	136	136		Denneman & van Gestel, 1990
<i>Lumbricus rubellus</i> , adult	peat	3.8	15.6	9.0	23	14 d	LC50	2298	1473		Van Gestel & Ma, 1990
<i>Lumbricus rubellus</i> , adult	artificial soil	6.0	8.1	8.1	23	14 d	LC50	362	447		Van Gestel & Ma, 1990
<i>Lumbricus rubellus</i> , adult	sand	5.6	6.1	2.4	23	14 d	LC50	1013	1661		Van Gestel & Ma, 1990
<i>Lumbricus rubellus</i> , adult	sand	5.0	3.7	1.4	23	14 d	LC50	1206	3260		Van Gestel & Ma, 1990

a growth

Table III. 61: Chronic toxicity of pentachlorophenol to soil organisms

organism	soil type	pH	% om	% clay	temp [° C]	exp. time	criterion	result test soil [mg/kg _{d.w.}]	result stand. soil [mg/kg _{d.w.}]	note	reference
macrophyta											
<i>Lactuca sativa</i>	OECD	7.5	1.6	-	23	14d	NOEC	0.32	1.6	a	Adema & Henzen, 1989
<i>Lactuca sativa</i>	OECD	7.5	1.6	-	23	7 d	NOEC	0.32	1.6	a	Adema & Henzen, 1989
bacteria											
<i>Rhizobium leguminosarum trifolii</i>	sandy loam	6.5	2.7	-	20	6 m	NOEC	50	185		Chaudri et al., 1996
annelida											
<i>Eisenia andrei</i> , juvenile	artificial soil	6.1	10	20	20	10 w	NOEC	> 32	>32	a, b	van Gestel et al., 1991
<i>Eisenia fetida andrei</i> , adult, 8-13 w	artificial soil	6.2	10	20	20	3 w	NOEC	32	32	c	van Gestel et al., 1989
<i>Eisenia fetida andrei</i> , adult, 8-13 w	artificial soil	6.2	10	20	20	3 w	NOEC	10	10	d	van Gestel et al., 1989

a growth

b sexual development

c cocoon production

d cocoon hatchability was determined after incubation of the cocoons in untreated soil for 5 weeks

Table III. 62: Toxicity of pentachlorophenol to terrestrial processes

microbial processes / enzyme activity	soil type	pH	% om	% clay	temp [° C]	exp. time	criterion	result test soil [mg/kg _{d.w.}]	result stand. soil [mg/kg _{d.w.}]	note	reference
H ₂ -oxidizing potential	sandy loam	7	3	18	25	2 h	EC50	177	590		Denneman & van Gestel, 1990
ATP-content	agricultural	6.4	3.1	33.6	20	48 d	NOEC	2	6.5		Denneman & van Gestel, 1990
acetate mineralization	sand-S	4.8	8.8	2.5	10	43 h	NOEC	210	840		van Beelen & Fleuren-Kemilå, 1993
acetate mineralization	sand, sub-S	5.9	<0.17	0.5	10	43 h	NOEC	27-41	135-205		van Beelen & Fleuren-Kemilå, 1993
acetate mineralization	sand, Dune	4.4	1.02	0.4	10	43 h	NOEC	800	4000		van Beelen & Fleuren-Kemilå, 1993
acetate mineralization	sand, Dune	4.4	0.85	0.5	10	43 h	NOEC	3-8	15-40		van Beelen & Fleuren-Kemilå, 1993
acetate mineralization	sand, meadow	6.4	<0.17	<0.1	10	18 d	NOEC	1200	6000		van Beelen et al., 1991
acetate mineralization	sand, meadow	6.4	<0.17	<0.1	10	41 d	NOEC	750	3750		van Beelen et al., 1991
acetate mineralization	sand, wood	4.5	0.85	0.4	10	24 h	NOEC	47	235		van Beelen et al., 1991
acetate mineralization	sand, wood	4.5	0.85	0.4	10	9 d	NOEC	144	720		van Beelen et al., 1991
acetate mineralization	Flevoland	8.2	1.02	1	10	18 h	NOEC	41	205		van Beelen et al., 1994
acetate mineralization	Flevoland, subsoil	8.3	1.87	1.2	10	4 d	NOEC	292	1460		van Beelen et al., 1994
acetate mineralization	Peel	3.8	4.42	0.9	10	6 d	NOEC	588	1330		van Beelen et al., 1994
acetate mineralization	Peel, subsoil	4.5	0.34	1.4	10	41 d	NOEC	113	565		van Beelen et al., 1994
biomass carbon	sand	6.9	4.5	12.5	-	-	EC71	9	20		Meghara et al., 1998
dehydrogenase	sand	6.9	4.5	12.5	-	-	EC71	9	20		Meghara et al., 1998
nitrate reductase	sand	6.9	4.5	12.5	-	-	EC76	9	20		Meghara et al., 1998

Table III. 63: Deviating tests for pentachlorophenol in soil

organism / microbial processes / enzyme activity	soil type	pH	% om	% clay	temp [° C]	exp. time	criterion	result test soil [mg/kg _{d.w.}]	result stand. soil [mg/kg _{d.w.}]	note	reference
algae											
algal populations, unspec.	sand	6.9	4.5	12.5	-	-	EC92	9	20	a	Meghara et al., 1998
nematoda											
<i>Panagrellus redivivus</i>	aqueous solution	7.5			21	96 h	LC50	13 mg/l			Debus & Niemann, 1994
microbial processes											
biomass carbon	sand	6.9	4.5	12.5	-	-	EC71	9	20		Meghara et al., 1998
enzyme activity											
urease	sand	6.9	4.5	12.5	-	-	EC87	9	20		Meghara et al., 1998

a algal populations (most probable number) in PCP-contaminated soil compared with uncontaminated soil

Table III. 64: Acute toxicity of 1-chloronaphthalene to fresh water species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
algae											
<i>Selenastrum capricornutum</i>	-	S	-	-	-	-	96 h	EC50	1.03		LeBlanc, 1984
crustacea											
<i>Daphnia magna</i> , =< 24 h	-	S	>=80%	7.4-9.4	160-186	mw	48 h	LC50	1.6		LeBlanc, 1980
pisces											
<i>Lepomis macrochirus</i>	-	S	-	-	-	-	96 h	LC50	2.3		LeBlanc, 1984

Table III. 65: Acute toxicity of 1-chloronaphthalene to marine species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
bacteriophyta											
<i>Vibrio fisheri</i>	-	S	-	-	-	am	15 min	EC50	1.7		Zhao & Wang, 1993
algae											
<i>Skeletonema costatum</i>	-	S	-	-	-	-	96 h	EC50	1.13		LeBlanc, 1984
crustacea											
<i>Artemia salina</i> , 30-d post hatch	-	S	-	-	-	-	24 h	LC50	0.78		Hoofman & Janssen, 1986
<i>Artemia salina</i> , nauplii	-	S	>=97%	-	-	-	24 h	LC50	1.8		Abernethy et al., 1986
<i>Artemia salina</i> , 2nd instar	-	S	98%	-	32 o/oo	am	24 h	LC50	0.91		Foster & Tullis, 1984
<i>Mysidopsis bahia</i>	-	S	-	-	-	-	96 h	LC50	0.37		LeBlanc, 1984
pisces											
<i>Cyprinodon variegatus</i>	Y	F	-	-	-	nw	96 h	LC50	0.69		Ward & Parrish, 1981
<i>Cyprinodon variegatus</i> , 8-15 mm	N	S	-	-	10-31 o/oo	nw	96 h	LC50	2.4		Heitmuller et al., 1981

Table III. 66: Chronic toxicity of 1-chloronaphthalene to marine species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
pisces											
<i>Cyprinodon variegatus</i> , embryo	Y	F	-	-	-	nw	28 d	NOEC	0.39	a α	Ward & Parrish, 1981

a mortality

Table III. 67: Acute toxicity of 2-chloronaphthalene to fresh water species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
crustacea											
<i>Daphnia magna</i> , 4-6 d	-	S	>=97%	-	-	-	48 h	LC50	1.6		Abernethy et al., 1986

Table III. 68: *Acute toxicity of 2-chloronaphthalene to marine species*

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
crustacea <i>Artemia salina</i> , nauplii	-	S	>=97%	-	-	-	24 h	LC50	2.3		Abernethy et al., 1986

Appendix IV Toxicity data on other compounds

In this appendix toxicity data on the remaining compounds (e.g. phthalates) are presented.

Content

<i>Table IV. 1: Acute toxicity of dimethyl phthalate (DMP) to fresh water organisms</i>	87
<i>Table IV. 2: Acute toxicity of dimethyl phthalate (DMP) to marine organisms</i>	87
<i>Table IV. 3: Chronic toxicity of dimethyl phthalate (DMP) to fresh water organisms</i>	87
<i>Table IV. 4: Chronic toxicity of dimethyl phthalate (DMP) to marine organisms</i>	87
<i>Table IV. 5: toxicity of dimethyl phthalate (DMP) to terrestrial species</i>	87
<i>Table IV. 6: Acute toxicity of diethyl phthalate (DEP) to fresh water organisms</i>	87
<i>Table IV. 7: Acute toxicity of diethyl phthalate (DEP) to marine organisms</i>	87
<i>Table IV. 8: Chronic toxicity of diethyl phthalate (DEP) to fresh water organisms</i>	87
<i>Table IV. 9: Toxicity of diethyl phthalate (DEP) to terrestrial species</i>	87
<i>Table IV. 10: Toxicity of di-n-butyl phthalate (DBP) to terrestrial species</i>	87
<i>Table IV. 11: Acute toxicity of di-iso-butyl phthalate (DIBP) to fresh water organisms</i>	87
<i>Table IV. 12: Acute toxicity of di-iso-butyl phthalate (DIBP) to marine organisms</i>	87
<i>Table IV. 13: Chronic toxicity of di-n-hexyl phthalate (DHP) to fresh water organisms</i>	87
<i>Table IV. 14: Acute toxicity of butylbenzyl phthalate (BBP) to fresh water organisms</i>	87
<i>Table IV. 15: Acute toxicity of butylbenzyl phthalate (BBP) to marine organisms</i>	87
<i>Table IV. 16: Chronic toxicity of butylbenzyl phthalate (BBP) to fresh water organisms</i>	87
<i>Table IV. 17: Chronic toxicity of dioctyl phthalate (DOP) to fresh water organisms</i>	87
<i>Table IV. 18: Acute toxicity of diethylhexyl phthalate (DEHP) to fresh water organisms</i>	87
<i>Table IV. 19: Acute toxicity of diethylhexyl phthalate (DEHP) to marine organisms</i>	87
<i>Table IV. 20: Chronic toxicity of diethylhexyl phthalate (DEHP) to fresh water organisms</i>	87
<i>Table IV. 21: Chronic toxicity of diethylhexyl phthalate (DEHP) to marine organisms</i>	87
<i>Table IV. 22: Toxicity of diethylhexyl phthalate (DEHP) to terrestrial species</i>	87
<i>Table IV. 23: Chronic toxicity of di-iso-decyl phthalate (DIDP) to fresh water organisms</i>	87
<i>Table IV. 24: Acute toxicity of cyclohexanone to fresh water species</i>	87
<i>Table IV. 25: Acute toxicity of cyclohexanone to marine species</i>	87
<i>Table IV. 26: Chronic toxicity of cyclohexanone to fresh water species</i>	87
<i>Table IV. 27: Acute toxicity of pyridine to fresh water species</i>	87
<i>Table IV. 28: Acute toxicity of pyridine to marine species</i>	87
<i>Table IV. 29: Chronic toxicity of pyridine to fresh water species</i>	87
<i>Table IV. 30: Toxicity of pyridine to soil organisms</i>	87
<i>Table IV. 31: Acute toxicity of tetrahydrofuran to fresh water species</i>	87
<i>Table IV. 32: Acute toxicity of tetrahydrofuran to marine species</i>	87
<i>Table IV. 33: Chronic toxicity of tetrahydrofuran to fresh water species</i>	87

Table IV. 1: Acute toxicity of dimethyl phthalate (DMP) to fresh water organisms

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
protozoa											
<i>Tetrahymena pyriformis</i>	N	S	-	-	-	-	48 h	EC50	537		Staples et al., 1997 (review)
alga											
<i>Pseudokirchneriella subspicata</i>	Y	S	-	7.8	25-50	-	96 h	EC50	142		Adams et al., 1995
crustacea											
<i>Daphnia magna</i>	Y	S	-	7.8	25-50	-	48 h	EC50	46		Adams et al., 1995
insecta											
<i>Paratanytarsus parthenogenica</i>	Y	S	-	7.8	25-50	-	96 h	LC50	377		Adams et al., 1995
pisces											
<i>Lepomis macrochirus</i>	Y	S	-	7/8	25-50	-	96 h	LC50	50		Adams et al., 1995
<i>Oncorhynchus mykiss</i>	Y	S	-	7.8	25-50	-	96 h	LC50	56		Adams et al., 1995
<i>Pimephales promelas</i>	Y	S	-	7.8	25-50	-	96 h	LC50	121		Adams et al., 1995
<i>Pimephales promelas</i>	Y	F	-	7.8	25-50	-	96 h	LC50	39		Adams et al., 1995

Table IV. 2: Acute toxicity of dimethyl phthalate (DMP) to marine organisms

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
bacteriophyta											
<i>Vibrio fischeri</i>	N	S	-	-	-	-	5-30 min	EC50	16-18		Staples et al., 1997 (review)
algae											
<i>Gymnodinium breve</i>	N	S	-	-	-	am	96 h	EC50	96	a	Wilson et al., 1978
<i>Gymnodinium breve</i>	N	S	-	-	-	am	96 h	EC50	54	a	Wilson et al., 1978
crustacea											
<i>Mysidopsis bahia</i>	Y	S	-	-	-	-	96 h	LC50	69		Adams et al., 1995
<i>Nitroca spinipes</i>	N	S	-	7.8	7	nw	96 h	EC50	62		Linden et al., 1979
pisces											
<i>Alburnus alburnus</i>	N	S	-	7.8	7	nw	96 h	LC50	100-115		Linden et al., 1979
<i>Cyprinodon variegatus</i>	Y	S	--	-	-	-	96 h	LC50	29		Adams et al., 1995
<i>Cyprinodon variegatus</i>	N	S	>80%	-	10-31	-	96 h	LC50	58		Heitmuller et al., 1981

a growth rate, replicate experiments

Table IV. 3: Chronic toxicity of dimethyl phthalate (DMP) to fresh water organisms

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
crustacea											
<i>Daphnia magna</i>	Y	F	comm	8.1	150-180	nw	21 d	NOEC	9.6	a	Rhodes et al., 1995

a mortality

Table IV. 4: Chronic toxicity of dimethyl phthalate (DMP) to marine organisms

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
crustacea											
<i>Palaemonetes pugio</i>	Y	S	-	-	17	am	30 d	NOEC	10	a	Laughlin et al., 1978

a larval mortality

Table IV. 5: toxicity of dimethyl phthalate (DMP) to terrestrial species

organism	soil type	pH	% om	% clay	temp [° C]	exp. time	criterion	result test soil [mg/kg _{d.w.}]	result stand. soil [mg/kg _{d.w.}]	note	reference
annelida											
<i>Eisenia fetida</i>	artificial soil	6.0	10	20	20	14 d	LC50	3160	3160		Neuhauser et al., 1985
macrophyta											
<i>Pisum sativum</i>	potting soil	-	-	-	23-25	14 d	EC50	1000	-		Herring & Bering, 1988
<i>Pisum sativum</i>	soaked in water	-	-	-	23-25	13 d	EC33	1000	-		Herring & Bering, 1988
<i>Spinacia oleracea</i>	potting soil	-	-	-	23-25	14 d	EC64	1000	-		Herring & Bering, 1988
<i>Spinacia oleracea</i>	soaked in water	-	-	-	23-25	13 d	EC15	1000	-		Herring & Bering, 1988

Table IV. 6: Acute toxicity of diethyl phthalate (DEP) to fresh water organisms

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
protozoa											
<i>Tetrahymena pyriformis</i>	N	S	-	-	-	-	48 h	EC50	132		Staples et al., 1997 (review)
algae											
<i>Pseudokirchneriella subspicata</i>	Y	S	-	7.8	25-50	-	96 h	EC50	16		Adams et al., 1995
<i>Scenedesmus subspicatus</i>	N	S	-				72 h	EC50	45	a	Kühn & Pattard, 1990
crustacea											
<i>Daphnia magna</i>	Y	S	-	7.8	25-50	-	48 h	EC50	86		Adams et al., 1995
<i>Daphnia magna</i>	N	S	-	8.0		am	24 h	EC50	41		Bringmann & Kühn, 1982
<i>Daphnia magna</i>	N	S	-	7.6	272	tap	24 h	LC50	75		Bringmann & Kühn, 1977a
<i>Daphnia magna</i>	N	S	-	7.6	272	tap	24 h	EC50	86		Kühn et al., 1989
insecta											
<i>Paratanytarsus parthenogenica</i>	Y	S	-	7.8	25-50	-	96 h	LC50	131		Adams et al., 1995
pisces											
<i>Lepomis macrochirus</i>	N	S	>80%	7.2	32-60	nw	96 h	LC50	110		Buccafusco et al., 1981
<i>Lepomis macrochirus</i>	Y	S	-	7/8	25-50	-	96 h	LC50	16.7		Adams et al., 1995
<i>Leuciscus idus melanotus</i>	N	F	-	-	-	-	48 h	LC50	53		Juhnke & Lüdemann, 1978
<i>Leuciscus idus melanotus</i>	N	F	-	-	-	-	48 h	LC50	61		Juhnke & Lüdemann, 1978
<i>Oncorhynchus mykiss</i>	Y	S	-	7.8	25-50	-	96 h	LC50	12		Adams et al., 1995
<i>Pimephales promelas</i>	Y	S	-	7.8	25-50	-	96 h	LC50	16.8		Adams et al., 1995
<i>Pimephales promelas</i>	Y	F	-	7.8	25-50	-	96 h	LC50	17		Adams et al., 1995
<i>Pimephales promelas</i>	Y	F	99%	7.4	44.6	-	96 h	LC50	31.8		Geiger et al., 1985

a growth rate

Table IV. 7: Acute toxicity of diethyl phthalate (DEP) to marine organisms

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
algae											
<i>Gymnodinium breve</i>	N	S	-	-	-	am	96 h	EC50	6.1		Wilson et al., 1978
<i>Gymnodinium breve</i>	N	S	-	-	-	am	96 h	EC50	3		Wilson et al., 1978
crustacea											
<i>Mysidopsis bahia</i>	N	S	-	-	-	-	96 h	LC50	10.3		Adams et al., 1995
pisces											
<i>Cyprinodon variegatus</i>	Y	S	--	-	-	-	96 h	LC50	29		Adams et al., 1995
<i>Cyprinodon variegatus</i>	N	S	>80%	-	10-31	-	96 h	LC50	30		Heitmuller et al., 1981

Table IV. 8: Chronic toxicity of diethyl phthalate (DEP) to fresh water organisms

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
protozoa											
<i>Chilomonas paramecium</i>	N	S	-	6.9		am	48 h	NOEC	53		Bringmann & Kühn, 1980b
<i>Entosiphon sulcatum</i>	N	S	-	6.9		am	72 h	NOEC	19		Bringmann & Kühn, 1978a
<i>Uronema parduczi</i>	N	S	-	6.9		am	20 h	NOEC	48		Bringmann & Kühn, 1980b
cyanophyta											
<i>Microcystis aeruginosa</i>	N	S	-	7.0		am	8d	NOEC	15		Bringmann & Kühn, 1976
algae											
<i>Scenedesmus quadricauda</i>	N	S	-	7.0		am	8 d	NOEC	10		Bringmann & Kühn, 1977b
crustacea											
<i>Daphnia magna</i>	Y	F	comm	8.1	150-180	nw	21 d	NOEC	25		Rhodes et al., 1995
<i>Daphnia magna</i>	N	S	-	7.6	272	tap	21 d	NOEC	13		Kühn et al., 1989

Table IV. 9: Toxicity of diethyl phthalate (DEP) to terrestrial species

organism	soil type	pH	% om	% clay	temp [° C]	exp. time	criterion	result test soil [mg/kg _{d.w.}]	result stand. soil [mg/kg _{d.w.}]	note	reference
macrophyta											
<i>Pisum sativum</i>	potting soil	-	-	-	23-25	14 d	EC20	1000	-		Herring & Bering, 1988
<i>Pisum sativum</i>	soaked in water	-	-	-	23-25	13 d	EC52	1000	-		Herring & Bering, 1988
<i>Lactuca sativa</i>	OECD	7.8	1.4	12	20	7 d	EC50	106	530		Hulzebos et al., 1993
<i>Lactuca sativa</i>	OECD	7.8	1.4	12	20	14 d	EC50	134	670		Hulzebos et al., 1993
<i>Spinacia oleracea</i>	potting soil	-	-	-	23-25	14 d	EC25	1000	-		Herring & Bering, 1988
<i>Spinacia oleracea</i>	soaked in water	-	-	-	23-25	13 d	EC27	1000	-		Herring & Bering, 1988

Table IV. 10: Toxicity of di-n-butyl phthalate (DBP) to terrestrial species

organism	soil type	pH	% om	% clay	temp [° C]	exp. time	criterion	result test soil [mg/kg _{d.w.}]	result stand. soil [mg/kg _{d.w.}]	note	reference
macrophyta											
<i>Lactuca sativa</i>	OECD	7.8	1.4	12	20	7 d	EC50	387	1935		Hulzebos et al., 1993
<i>Lactuca sativa</i>	OECD	7.8	1.4	12	20	14 d	EC50	>1000	>5000		Hulzebos et al., 1993

Table IV. 11: Acute toxicity of di-iso-butyl phthalate (DIBP) to fresh water organisms

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
pisces											
<i>Pimephales promelas</i>	Y	F					96 h	LC50	0.9		Geiger et al., 1985

Table IV. 12: Acute toxicity of di-iso-butyl phthalate (DIBP) to marine organisms

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
crustacea											
<i>Nitroca spinipes</i>	N	S	-	7.8	7	nw	96 h	EC50	3.0		Linden et al., 1979

Table IV. 13: Chronic toxicity of di-n-hexyl phthalate (DHP) to fresh water organisms

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
crustacea											
<i>Daphnia magna</i>	Y	F	comm	8.1	150-180	nw	21 d	NOEC	0.084	a	Rhodes et al., 1995

a mortality and reproduction

Table IV. 14: Acute toxicity of butylbenzyl phthalate (BBP) to fresh water organisms

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
algae											
<i>Dunaliella tertiolecta</i>	N	S	comm	-	-	-	96 h	EC50	1		Gledhill et al., 1980
<i>Microcystus aeruginosa</i>	N	S	comm	-	-	-	96 h	EC50	1000	a	Gledhill et al., 1980
<i>Navicula pelliculosa</i>	N	S	comm	-	-	-	96 h	EC50	0.6		Gledhill et al., 1980
<i>Pseudokirchneriella subspicata</i>	N	S	comm	-	-	-	96 h	EC50	0.4		Gledhill et al., 1980
<i>Pseudokirchneriella subspicata</i>	Y	S	-	7.8	25-50	-	96 h	EC50	0.21		Adams et al., 1995
<i>Skeletonema costatum</i>	N	S	comm	-	-	-	96 h	EC50	0.6		Gledhill et al., 1980
crustacea											
<i>Daphnia magna</i>	N	S	comm	7.7	120-250	-	48 h	LC50	0.82		Adams & Heidolph, 1985
<i>Daphnia magna</i>	N	S	comm	7.8	110	nw	48 h	EC50	3.7		Gledhill et al., 1980
pisces											
<i>Lepomis macrochirus</i>	N	S	>80%	7.2	32-60	nw	96 h	LC50	43	a	Buccafusco et al., 1981
<i>Lepomis macrochirus</i>	N	S	comm	7.5	40	rw	96 h	LC50	1.7		Gledhill et al., 1980
<i>Lepomis macrochirus</i>	Y	S	-	7/8	25-50	-	96 h	LC50	1.70		Adams et al., 1995
<i>Oncorhynchus mykiss</i>	Y	F	-	7.8	25-50	-	96 h	LC50	0.82		Adams et al., 1995
<i>Oncorhynchus mykiss</i>	N	S	comm	7.5	40	rw	96 h	LC50	3.3		Gledhill et al., 1980
<i>Pimephales promelas</i>	Y	F	-	7.8	25-50	-	96 h	LC50	1.50		Adams et al., 1995
<i>Pimephales promelas</i>	N	S	comm	7.5	40	rw	96 h	LC50	2.1		Gledhill et al., 1980
<i>Pimephales promelas</i>	N	S	comm	7.5	160	rw	96 h	LC50	5.3		Gledhill et al., 1980

a more than 10 times the water solubility (recommended value of 2.7 mg/l by Staples et al., 1997)

Table IV. 15: Acute toxicity of butylbenzyl phthalate (BBP) to marine organisms

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
crustacea											
<i>Myxidopsis bahia</i>	N	S	comm		18	nw	96 h	LC50	0.9		Gledhill et al., 1980
pisces											
<i>Cymatogaster aggregata</i>	Y	F	-	-	31	-	96 h	LC50	0.51		Ozretich et al, 1983
<i>Cyprinodon variegatus</i>	N	S	>80%	-	10-31	-	96 h	LC50	440	a	Heitmuller et al., 1981
<i>Cyprinodon variegatus</i>	N	S	comm	-	24	nw	96 h	LC50	3.0		Gledhill et al., 1980
<i>Parophrys vetulus</i>	N	S	-	7.3	25	-	96 h	LC50	0.66		Randall et al., 1983
<i>Parophrys vetulus</i>	Y	F	-	7.3	31	-	96 h	LC50	0.55		Randall et al., 1983

a more than 10 times the water solubility (recommended value of 2.7 mg/l by Staples et al., 1997)

Table IV. 16: Chronic toxicity of butylbenzyl phthalate (BBP) to fresh water organisms

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
crustacea											
<i>Daphnia magna</i>	Y	S	comm	7.9	240-310	-	21 d	NOEC	0.35		Adams & Heidolph, 1985
<i>Daphnia magna</i>	Y	F	comm	8.2	160-180	-	21 d	NOEC	0.26	a, b, c	Adams & Heidolph, 1985
<i>Daphnia magna</i>	Y	F	comm	8.1	150-180	nw	21 d	NOEC	0.28	a, c	Rhodes et al., 1995
<i>Daphnia magna</i>	Y	F	comm	8.1	175	nw	21 d	NOEC	0.26	c	Gledhill et al., 1980

a mortality

b growth

c reproduction

Table IV. 17: Chronic toxicity of dioctyl phthalate (DOP) to fresh water organisms

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
crustacea											
<i>Daphnia magna</i>	N	F	99.5	7.9	85	-	16 d	NOEC	0.32	a, b	McCarthy & Whitmore, 1985
pisces											
<i>Pimephales promelas</i>	N	F	99.5	7.9	85	-	20 d	NOEC	3.2	a, c	McCarthy & Whitmore, 1985

a More than 10 times the water solubility (recommended value of 0.5 µg/l by Staples et al., 1997)

b fecundity

c hatchability

Table IV. 18: Acute toxicity of diethylhexyl phthalate (DEHP) to fresh water organisms

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
crustacea											
<i>Daphnia magna</i>	N	S	comm	7.7	120-250	-	48 h	LC50	2		Adams & Heidolph, 1985
<i>Daphnia pulex</i>	N	S	-	-	-	-	48 h	LC50	0.133	a	Staples et al., 1997 (review)
macrophyta											
<i>Lemna gibba</i>	N	S	-	-	-	-	7 d	EC50	2060		Wang, 1989 (review)

a results from 3 tests

Table IV. 19: Acute toxicity of diethylhexyl phthalate (DEHP) to marine organisms

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
bacteriophyta											
<i>Vibrio fischeri</i>	N	S	-	-	-	-	5-30 min	EC50	800		Staples et al., 1997 (review)
algae											
<i>Gymnodinium breve</i>	N	S	-	-	-	am	96 h	EC50	31000	a	Wilson et al., 1978

a growth rate, replicate experiments

Table IV. 20: Chronic toxicity of diethylhexyl phthalate (DEHP) to fresh water organisms

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
crustacea											
<i>Daphnia magna</i>	Y	S	comm	7.9	240-310	-	21 d	NOEC	0.64	a, c	Adams & Heidolph, 1985
<i>Daphnia magna</i>	Y	F	techn.	7.9	300	nw	21 d	NOEC	0.158	a, c	Knowles et al., 1987
<i>Daphnia magna</i>	Y	F	comm	8.1	150-180	nw	21 d	NOEC	0.077	a	Rhodes et al., 1995
<i>Daphnia magna</i>	N	S	97%	-	-	-	21 d	NOEC	0.32	c	Adema et al., 1981
<i>Daphnia magna</i>	N	S	97%	-	-	-	14 d	NOEC	0.032	d	Adema et al., 1981
pisces											
<i>Oncorhynchus mykiss</i>	N	F	-	-	-	-	90 d	NOEC	0.054	b	Staples et al., 1997 (review)
<i>Pimephales promelas</i>	N	F	-	-	-	-	127 d	NOEC	0.10	b	Staples et al., 1997 (review)
<i>Salvelinus fontinalis</i>	N	F	-	-	-	-	150 d	NOEC	0.052	b	Staples et al., 1997 (review)

a survival

b growth

c reproduction

d mortality F1 generation

Table IV. 21: Chronic toxicity of diethylhexyl phthalate (DEHP) to marine organisms

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
crustacea											
<i>Palaemonetes pugio</i>	Y	S	-	-	17	am	28 d	NOEC	1	a	Laughlin et al., 1978

a larval mortality

Table IV. 22: Toxicity of diethylhexyl phthalate (DEHP) to terrestrial species

organism	soil type	pH	% om	% clay	temp [° C]	exp. time	criterion	result test soil [mg/kg _{d.w.}]	result stand. soil [mg/kg _{d.w.}]	note	reference
macrophyta											
<i>Lactuca sativa</i>	OECD	7.8	1.4	12	20	7 d	EC50	>1000	>5000	a	Hulzebos et al., 1993
<i>Lactuca sativa</i>	OECD	7.8	1.4	12	20	14 d	EC50	>1000	>5000	a	Hulzebos et al., 1993

a growth

Table IV. 23: Chronic toxicity of di-iso-decyl phthalate (DIDP) to fresh water organisms

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
crustacea											
<i>Daphnia magna</i>	Y	F	comm	8.1	150-180	nw	21 d	NOEC	0.030	ab	Rhodes et al., 1995
<i>Daphnia magna</i>	Y	F	comm	8.1	150-180	nw	21 d	NOEC	0.060	ac	Rhodes et al., 1995

a far above water solubility

b mortality

c reproduction

Table IV. 24: Acute toxicity of cyclohexanone to fresh water species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
algae											
<i>Chlamydomonas reinhardtii</i>	Y	S	ag	6.5-7.5	-	am	72 h	EC50	32.9	a	Brack & Rottler, 1994
crustacea											
<i>Daphnia magna</i> , 24 h	N	S	-	7.6	272	am	24 h	LC50	800		Bringmann & Kühn, 1977a
pisces											
<i>Leuciscus idus melanotus</i>	N	S	-	7-8	255	tap	48 h	LC50	536, 752		Juhnke & Lüdemann, 1978
<i>Pimephales promelas</i>	Y	S	99.8%	7.6	47.1	nw	96 h	LC50	527		Brooke et al., 1984
<i>Pimephales promelas</i>	-	S	-	-	-	am	96 h	LC50	634		Vaishnav & Korthals, 1990

a sealed bipartite vessels

Table IV. 25: Acute toxicity of cyclohexanone to marine species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
bacteriophyta <i>Vibrio fisheri</i>	-	S	-	-	-	am	15 min	EC50	110		Zhao & Wang, 1993

Table IV. 26: Chronic toxicity of cyclohexanone to fresh water species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
protozoa											
<i>Chilomonas paramecium</i>	N	S	-	6.9	142	am	48 h	NOEC	573		Bringmann et al., 1980
<i>Entosiphon sulcatum</i>	N	S	-	6.9	142	am	72 h	NOEC	545		Bringmann, 1978
<i>Uronema parduczi</i>	N	S	-	6.9	142	am	20 h	NOEC	280		Bringmann & Kühn, 1980b
bacteriophyta											
<i>Pseudomonas putida</i>	N	S	-	7.0	60	am	16 h	NOEC	180		Bringmann & Kühn, 1976
cyanophyta											
<i>Microcystis aeruginosa</i>	N	S	-	7.0	60	am	8 d	NOEC	52		Bringmann & Kühn, 1978a,b
algae											
<i>Scenedesmus quadricauda</i>	N	S	-	7.0	-	am	8 d	NOEC	370		Bringmann & Kühn, 1977b

Table IV. 27: Acute toxicity of pyridine to fresh water species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
insecta											
<i>Chironomus gr. thummi</i>	N	S	>98%	8.2	200	am	48 h	LC50	229		Slooff, 1983
<i>Cloëon dipterum</i>	N	S	>98%	8.2	200	am	48 h	LC50	165		Slooff, 1983
<i>Corixa punctata</i>	N	S	>98%	8.2	200	am	48 h	LC50	30		Slooff, 1983
<i>Ischnura elegans</i>	N	S	>98%	8.2	200	am	48 h	LC50	410		Slooff, 1983
<i>Nemoura cinerea</i>	N	S	>98%	8.2	200	am	48 h	LC50	254		Slooff, 1983
coelenterata											
<i>Hydro oligactis</i>	N	S	>98%	8.2	200	am	48 h	LC50	1150		Slooff, 1983
annelida											
<i>Dugesia cf. lugubris</i>	N	S	>98%	8.2	200	am	48 h	LC50	1900		Slooff, 1983
<i>Erpobdella octoculata</i>	N	S	>98%	8.2	200	am	48 h	LC50	2400		Slooff, 1983
Tubificidae	N	S	>98%	8.2	200	am	48 h	LC50	1300		Slooff, 1983
mollusca											
<i>Lymnaea stagnalis</i>	N	S	>98%	8.2	200	am	48 h	LC50	350		Slooff, 1983
crustacea											
<i>Asellus aquaticus</i>	N	S	>98%	8.2	200	am	48 h	LC50	220		Slooff, 1983
<i>Daphnia curculata</i> , 11 d	N	S	>=98%	7.9	100	am	48 h	LC50	2470		Canton & Adema, 1978
<i>Daphnia magna</i> , < 1 d	N	S	-	8.0	-	am	24 h	LC50	240		Bringmann & Kühn, 1977a
<i>Daphnia magna</i> , < 1 d	N	S	-	8.0	-	am	24 h	EC50	520		Bringmann & Kühn, 1982
<i>Daphnia magna</i> , < 1 d	N	S	>=98%	7.9	100	am	48 h	LC50	1165	a	Canton & Adema, 1978
<i>Daphnia magna</i> , < 1 d	N	S	>=98%	7.9	100	am	48 h	LC50	1755	a	Canton & Adema, 1978
<i>Daphnia magna</i> , < 1 d	N	S	>=98%	7.9	100	am	48 h	LC50	1130	a	Canton & Adema, 1978
<i>Daphnia pulex</i> , < 1 d	N	S	>=98%	7.9	100	am	48 h	LC50	575		Canton & Adema, 1978
<i>Gammarus pulex</i>	N	S	>98%	8.2	200	am	48 h	LC50	182		Slooff, 1983
pisces											
<i>Brachydanio rerio</i>	N	S	-	7.5	-	-	96 h	LC50	>512		Wellens, 1982
<i>Pimephales promelas</i>	Y	S	>99%	7.7	47.4	nw	96 h	LC50	94		Geiger et al., 1986
amphibia											
<i>Ambystoma mexicanum</i> , 3-4 w after hatching	-	S	-	8.2	200	DSW	48 h	LC50	950		Slooff & Baerselman, 1980
<i>Xenopus laevis</i> , 3-4 w after hatching	-	S	-	8.2	200	DSW	48 h	LC50	1400		Slooff & Baerselman, 1980

a 3 different experiments performed in 2 different laboratoria

Table IV. 28: Acute toxicity of pyridine to marine species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
bacteriophyta 13 bacterial strains	-	S	ag	-	-	am	16 h	EC50	3300		Warne et al., 1989
crustacea <i>Artemia salina</i> , 2nd instar	-	S	98%	-	32 o/oo	am	24 h	LC50	1318		Foster & Tullis, 1984

Table IV. 29: Chronic toxicity of pyridine to fresh water species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
protozoa <i>Chilomonas paramecium</i>	N	S	-	6.9	142	am	48 h	NOEC	3.9		Bringmann et al., 1980
<i>Entosiphon sulcatum</i>				6.9			72 h	NOEC	3.5		Bringmann, 1978
<i>Uronema parduczi</i>	N	S	-	6.9	142	am	20 h	NOEC	183		Bringmann & Kühn, 1980b
bacteriophyta <i>Pseudomonas putida</i>	N	S	-	7.0	60	am	16 h	NOEC	340		Bringmann & Kühn, 1976
cyanophyta <i>Microcystis aeruginosa</i>	N	S	-	7.0	60	am	8 d	NOEC	28		Bringmann & Kühn, 1978a,b
algae <i>Chlorella pyrenoidosa</i>	N	S	>98%	8.2	200	am	48 h	NOEC	150		Slooff et al., 1983
<i>Scenedesmus pannonicus</i>	N	S	-	8.2	200	am	48 h	NOEC	280		Slooff et al., 1983
<i>Scenedesmus quadricauda</i>	N	S	-	7.0	-	am	8 d	NOEC	120		Bringmann & Kühn, 1977b
<i>Selenastrum capricornutum</i>	N	S	>98%	8.2	200	am	96 h	NOEC	50		Slooff et al., 1983

Table IV. 30: Toxicity of pyridine to soil organisms

organism	soil type	pH	% om	% clay	temp [° C]	exp. time	criterion	result test soil [mg/kg _{d.w.}]	result stand. soil [mg/kg _{d.w.}]	note	reference
macrophyta											
<i>Lactuca sativa</i>	OECD	7.5	1.6	-	23	14d	NOEC	32	160	a	Adema & Henzen, 1989
<i>Lactuca sativa</i>	OECD	7.5	1.6	-	23	7 d	NOEC	10	50	a	Adema & Henzen, 1989
<i>Lactuca sativa</i>	OECD	7.8	1.4	12	20	14 d	EC50	203	1015	a	Hulzebos et al., 1993

a growth

Table IV. 31: Acute toxicity of tetrahydrofuran to fresh water species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
crustacea											
<i>Daphnia magna</i> , 24 h	N	S	-	7.6	272	am	24 h	EC50	5930		Bringmann & Kühn, 1982
pisces											
<i>Leuciscus idus melanotus</i>	N	S	-	7-8	255	tap	48 h	LC50	2820, 2930		Juhnke & Lüdemann, 1978
<i>Pimephales promelas</i>	Y	S	99%	7.6	44.5	nw	96 h	LC50	2160		Brooke et al., 1984

Table IV. 32: Acute toxicity of tetrahydrofuran to marine species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
bacteriophyta											
<i>Vibrio fischeri</i>	-	S	-	-	-	am	15 min	EC50	908		Zhao & Wang, 1993

Table IV. 33: Chronic toxicity of tetrahydrofuran to fresh water species

organism	A	test type	test subst. purity	pH	hardness salinity [mg CaCO ₃ /l]	test water	exp. time	criterion	value [mg/l]	note	reference
protozoa											
<i>Chilomonas paramecium</i>	N	S	-	6.9	142	am	48 h	NOEC	2868	b	Bringmann et al., 1980
<i>Uronema parduczi</i>	N	S	-	6.9	142	am	20 h	NOEC	858	b	Bringmann & Kühn, 1980b
bacteriophyta											
<i>Pseudomonas putida</i>	N	S	-	7.0	60	am	16 h	NOEC	580	b	Bringmann & Kühn, 1976
pisces											
<i>Pimephales promelas</i> , eggs	Y	F	>97%	7.7	45.2	nw	36 d	NOEC	216	a	Call et al., 1985
cyanophyta											
<i>Microcystis aeruginosa</i>	N	S	-	7.0	60	am	8 d	NOEC	225	a	Bringmann & Kühn, 1978a,b
algae											
<i>Scenedesmus quadricauda</i>	N	S	-	7.0	-	am	8 d	NOEC	3700	a	Bringmann & Kühn, 1977b

a growth

b cell multiplication inhibition

References

Cited references

- Abernathy S, Bobra AM, Shiu WY, Wells PG, Mackay D. 1986. Acute lethal toxicity of hydrocarbons and chlorinated hydrocarbons to two planktonic crustaceans: The key role of organism-water partitioning. *Aquat Toxicol* 8: 163-174.
- Adams WJ, Heidolph BB. 1985. Short-cut chronic toxicity estimates using *Daphnia magna*. In: Cardwell RD, Purdyland R, Bahner RC, eds. *Aquatic Toxicology and Hazard assessment*. Seventh Symposium American Society for Testing Materials, Philadelphia, PA, USA, pp 87-103. Cited in Staples et al., 1997.
- Adams WJ, Biddinger GR, Robillard KA, Gorsuch JW. 1995. A summary of the acute toxicity of 14 phthalate esters to representative aquatic organisms. *Environ Toxicol Chem* 14 (9): 1569-1574.
- Adema DMM. 1978. *Daphnia magna* as a test animal in acute and chronic toxicity tests. *Hydrobiologia* 59 (2): 125-134.
- Adema DMM, Vink GJ. 1981. A comparative study of the toxicity of 1,1,2-trichloroethane, dieldrin, pentachlorophenol and 3,4-dichloroaniline for marine and fresh water organisms. *Chemosphere* 10 (6): 533-554.
- Adema DMM, Canton JH, Slooff W, Hanstveit AO. 1981. Onderzoek naar geschikte combinatie toetsmethoden ter bepaling van de aquatische toxiciteit van milieugevaarlijke stoffen. Rijksinstituut voor Drinkwatervoorziening (RID) Report no. CL 81/100 / Bilthoven, The Netherlands: National Institute of Public Health (RIV). Report no. 627905 001.
- Adema DMM, Henzen L. 1989. A comparison of plant toxicities of some industrial chemicals in soil culture and soilless culture. *Ecotoxicol Environ Saf* 18: 219-229.
- Agrawal HP. 1987. Evaluation of the toxicity of phenol and sodium pentachlorophenate to the snail *Indoplanorbis exustus* (Deshayes). *J Anim Morphol Physiol* 34 (1&2): 107-112.
- Alabaster JS. 1969. Survival of fish in 164 herbicides, insecticides, fungicides, wetting agents and miscellaneous substances. *International Pest Control* march/april: 29-35.
- Alabaster JS, Schurben DG, Mallett MJ. 1983. The acute lethal toxicity of mixtures of cyanide and ammonia to smolts of salmon, *Salmo salar L.* at low concentrations of dissolved oxygen. *J Fish Biol* 22: 215-222.
- Alekseyev VA, Antipin BN. 1974. Toxicological characteristics and symptoms of acute phenol poisoning in some freshwater crustaceans and molluscs. *Hydrobiol J* 12: 27-33.
- Bearden AP, Schultz TW. 1997. Structure-activity relationships for *Pimephales* and *Tetrahymena*: A mechanism of action approach. *Environ Toxicol Chem* 16 (6): 1311-1317.
- Beltrame P, Beltrame PL, Carniti P. 1984. Inhibiting action of chloro- and nitrophenols on biodegradation of phenols: a structure-toxicity relationship. *Chemosphere* 13 (1): 3-9.
- Berglund R, Dave G. 1984. Acute toxicity of chromate, DDT, PCP, TPBs, and zinc to *Daphnia magna* cultured in hard and soft water. *Bull Environ Contam Toxicol* 33: 63-68.
- Billard R, Roubaud P. 1985. The effect of metals and cyanide on fertilization in rainbow trout (*Salmo gairdneri*). *Wat Res* 19 (2): 209-214.
- Botsford JL, Rivera J, Navarez J, Riley R, Wright T, Baker R. 1997. Assay for toxic chemicals using bacteria. *Bull Environ Contam Toxicol* 59 (6): 1000-1009.

- Boyd EM, Meharg AA, Wright J, Killham K. 1997. Assessment of toxicological interactions of benzene and its primary degradation products (catechol and phenol) using a flux-modified bacterial bioassay. *Environ Toxicol Chem* 16 (5): 849-856.
- Brack W, Rottler H. 1994. Toxicity testing of highly volatile chemicals with green algae. *Environ Sci Pollut Res* 1(4): 223-228.
- Bremner JM, Krogmeier MJ. 1990. Effects of urease inhibitors on germination of seeds in soil. *Commun in Soil Sci Plant Anal* 21 (3&4): 311-321.
- Bringmann G, Kühn R. 1976. Vergleichend Befunde der Schadwirkung wassergefährdender Stoffe gegen Bakterien (*Pseudomonas putida*) und Blaualgen (*Microcystis aeruginosa*) GWF- Wasser/Abwasser 117 (9): 410-413.
- Bringmann G., Kühn R. 1977a. Befunde der Schadwirkung wassergefährdender Stoffe gegen *Daphnia magna*. *Z f Wasser- und Abwasser-Forsch.* 10 (5): 161-166.
- Bringmann G, Kühn R. 1977b. Grenzwerte der Schadwirkung wassergefährdender Stoffe gegen Bakterien (*Pseudomonas putida*) und Grünalgen (*Scenedesmus quadricauda*) im Zellvermehrungshemmtest. *Z f Wasser- und Abwasser-Forsch* 10 (3/4): 87-98.
- Bringmann G. 1978. Bestimmung der biologischen Schadwirkung wassergefährdender Stoffe gegen Protozoen. I. Bakterienfressende Flagellaten (Modelorganismus *Entisiphon sulcatum* Stein) *Z f Wasser- und Abwasser-Forsch* 11 (6): 210-215.
- Bringmann G, Kühn R. 1978a. Grenzwerte der Schadwirkung wassergefährdender Stoffe gegen Blaualgen (*Microcystis aeruginosa*) und Grünalgen (*Scenedesmus quadricauda*) im Zellvermehrungshemmtest. *Vom Wasser*, 50: 45-60.
- Bringmann G, Kühn R. 1978b. Testing of substances for their toxicity threshold: model organism *Microcystis* (diplocystis) *aeruginosa* and *Scenedesmus quadricauda*. *Mitt Internat Verein Limnol* 21: 275-284.
- Bringmann G, Kühn R. 1980a. Comparison of the toxicity thresholds of water pollutants to bacteria, algae, and protozoa in the cell multiplication inhibition test. *Wat Res* 14: 231-241.
- Bringmann G, Kühn R. 1980b. Bestimmung der biologischen Schadwirkung wassergefährdender Stoffe gegen Protozoen. II. Bakterienfressende Ciliaten. *Z f Wasser- und Abwasser-Forsch* 13 (1): 26-31.
- Bringmann G, Kühn R, Winter A. 1980. Bestimmung der biologischen Schadwirkung wassergefährdender Stoffe gegen Protozoen. III. Saprozoische Flagellaten. *Z f Wasser- und Abwasser-Forsch* 13 (5): 170-173.
- Bringmann G, Kühn R. 1982. Ergebnisse der Schadwirkung wassergefährdender Stoffe gegen *Daphnia magna* in einem weiterentwickelten standardisierten Testverfahren. *Z f Wasser- und Abwasser-Forsch.* 15 (1): 1-6.
- Brooke LT, Call DJ, Geiger DL, Northcott CE. 1984. Acute toxicities of organic chemicals to fathead minnows (*Pimephales promelas*). Centre for Lake Superior Environmental Studies, University of Wisconsin-Superior, Volume 1.
- Bryant SE, Schultz TW. 1994. Toxicological assessment of biotransformation products of pentachlorophenol: *Tetrahymena* population growth impairment. *Arch Environ Contam Toxicol* 26: 299-303.
- Buccafusco RJ, Ells SJ, LeBlanc GA. 1981. Acute toxicity of priority pollutants to bluegill (*Lepomis macrochirus*). *Bull Environ Contam Toxicol* 26: 446-452.
- Bulich AA, Greene MW, Isenberg DL. 1981. Reliability of the bacterial luminescence assay for determination of the toxicity of pure compounds and complex effluents. *Aquat Toxicol Hazard Assessm: Fourth Conference. ASTM STP* 737: 338-347.
- Burridge TR, Lavery T, Lam PKS. 1995. Acute toxicity tests using *Phyllospora comosa* (Labillardiere) C. Agardh (Phaeophyta: Fucales) and *Allorchestes compressa* Dana (Crustacea: Amphipoda). *Bull Environ Contam Toxicol* 55: 621-628.

- Cairns Jr. J, Messenger DI, Calhoun WF. 1976. Invertebrate response to thermal shock following exposure to acutely sub-lethal concentrations of chemicals. *Arch Hydrobiol* 77 (2): 164-175.
- Call DJ, Brooke LT, Knuth ML, Poirier SH, Hoglund MD. 1985. Fish subchronic toxicity prediction model for industrial organic chemicals that produce narcosis. *Environ Toxicol Chem* 4: 335-341.
- Calleja MC, Persoone G, Geladi P. 1994. Comparative acute toxicity of the first 50 multicentre evaluation on *in vitro* cytotoxicity chemicals to aquatic non-vertebrates. *Arch Environ Contam Toxicol* 26: 69-78.
- Canton JH, Adema AMM. 1978. Reproducibility of short-term and reproduction toxicity experiments with *Daphnia magna* and comparison of the sensitivity of *Daphnia magna* with *Daphnia pulex* and *Daphnia cucullata* in short-term experiments. *Hydrobiologia* 59 (2): 135-140.
- Chagnon N, Hlohowskyj I. 1989. Effects of phenol exposure on the thermal tolerance ability of the central stoneroller minnow. *Bull Environ Contam Toxicol* 42: 614-619.
- Chang JC, Taylor PB, Leach FR. 1981. Use of the Microtox assay system for environmental samples. *Bull Environ Contam Toxicol* 26: 150-156.
- Chaudri AM, McGrath SP, Knight BP, Johnson DL, Jones KC. 1996. Toxicity of organic compounds to the indigenous population of *Rhizobium leguminosarum* biovar. trifolii in soil. *Soil Biol Biochem* 28 (10/11): 1483-1487.
- Cowgill UM, Milazzo DP, Landenberger BD. 1989. Toxicity of nine benchmark chemicals to *Skeletonema costatum*, a marine diatom. *Environ Toxicol Chem* 8: 451-455.
- Cowgill UM, Milazzo DP. 1991. The sensitivity of *Ceriodaphnia dubia* and *Daphnia magna* to seven chemicals utilizing the three-brood test. *Arch Environ Contam Toxicol* 20: 211-217.
- Cowgill UM, Milazzo DP, Landenberger BD. 1991. The sensitivity of *Lemna gibba* G-3 and four clones of *Lemna minor* to eight common chemicals using a 7-day test. *Res J Water Pollut Control Fed* 63: 991-998.
- Crisinel A, Delaunay L, Rossel D, Tarradellas J, Meyer H, Saïah H, Vogel P, Delisle C, Blaise C. 1994. Cyst-based ecotoxicological tests using anostracans: Comparison of two species of *Streptocephalus*. *Environ Toxicol Water Qual* 9: 317-326.
- Cronin MTD, Schultz TW. 1996. Structure-toxicity relationships for phenols to *Tetrahymena pyriformis*. *Chemosphere* 32 (8): 1453-1468.
- Cronin MTD, Schultz TW. 1997. Validation of *Vibrio fischeri* acute toxicity data: Mechanism of action-based QSARs for non-polar narcotics and polar narcotic phenols. *Sci Total Environ* 204: 75-88.
- Curtis MW, Ward CH. 1981. Aquatic toxicity of forty industrial chemicals: testing in support of hazardous substance spill prevention regulation. *J Hydrol* 51: 359-367.
- Debus R, Niemann R. 1994. Nematode test to estimate the hazard potential of solved contamination. *Chemosphere* 29 (3): 611-621.
- Deneer JW, Seinen W, Hermens JLM. 1988a. Growth of *Daphnia magna* exposed to mixtures of chemicals with diverse modes of action. *Ecotoxicol Environ Saf* 15 (1): 72-77.
- Deneer JW, Sinnege TL, Seinen W, Hermens JLM. 1988b. The joint acute toxicity to *Daphnia magna* of industrial organic chemicals at low concentrations. *Aquat Toxicol* 12: 33-38.
- DeGraeve G M, Geiger DL, Meyer JS, Bergman HL. 1980. Acute and embryo-larval toxicity of phenolic compounds to aquatic biota. *Arch Environ Contam Toxicol* 9: 557-568.
- Denneman CAJ, Van Gestel CAM. 1990. Bodemverontreiniging en bodemecosystemen: voorstel voor C-(toetsings)waarden op basis van ecotoxicologische risico's.

- Bilthoven, the Netherlands: National Institute of Public Health and the Environment (RIVM), Report no. 725201001.
- Devillers J, Chambon P. 1986. Acute toxicity and QSAR of chlorophenols on *Daphnia magna*. Bull Environ Contam Toxicol 37: 599-605.
- Devillers J, Chambon P, Zakarya D. 1987. A predictive structure-toxicity model with *Daphnia magna*. Chemosphere 16 (6): 1149-1163.
- Devillers J, Boule P, Vasseur P, Prevot P, Steiman R, Seigle-Murandi F, Benoit-Guyod JL, Nenzda M, Gioni C, Dive D, Chambon P. 1990. Environmental and health risks of hydroquinone. Ecotoxicol Environ Saf 19: 327-354.
- Dixon DG, Leduc G. 1981. Chronic cyanide poisoning of rainbow trout and its effects on growth, respiration, and liver histopathology. Arch Environ Contam Toxicol 10 (1): 117-131.
- Dutka BJ, Kwan KK. 1981. Comparison of three microbial toxicity screening tests with the microtox test. Bull Environ Contam Toxicol 27: 753-757.
- Eisler R. 1991. Cyanide hazards to fish, wildlife, and invertebrates: A synoptic review. US Fish and Wildlife Service. Biological Report 85(123); I-III, 1-55.
- Ewell WS, Gorsuch JW, Kringle RO, Robillard KA, Spiegel RC. 1986. Simultaneous evaluation of the acute effects of chemicals on seven aquatic species. Environ Toxicol Chem 5: 831-840.
- Falk-Petersen I-G, Kjorsvik E, Lonning S, Moller Naley A, Sydnes LK. 1985. Toxic effects of hydroxylated aromatic hydrocarbons on marine embryos. Sarsia 70: 11-16.
- Ferrando MD, Andreu-Moliner E, Fernandez-Casalderrey A. 1992. Relative sensitivity of *Daphnia magna* and *Brachionus calyciflorus* to five pesticides. J Environ Sci Health, B27, 5: 511-522.
- Fogels A, Sprague JB. 1977. Comparative short-term tolerance of zebrafish, flagfish, and rainbow trout to five poisons including potential reference toxicants. Wat Res 11: 811-817.
- Foster GD, Tullis RE. 1984. A quantitative-structure activity relationship between partition coefficients and the acute toxicity of naphthalene derivatives in *Artemia salina* nauplii. Aquat Toxicol 5: 245-254.
- Franco PJ, Daniels KL, Cushman RM, Kazlow GA. 1984. Acute toxicity of a synthetic oil, aniline and phenol to laboratory and natural populations of chironomid (Diptera) larvae. Environ Pollut (Series A) 34: 321-331.
- Geiger DL, Northcott CE, Call DJ, Brooke LT. 1985. Acute toxicities of organic chemicals to fathead minnows (*Pimephales promelas*). Superior, WI, USA: Centre for Lake Superior Environmental Studies, University of Wisconsin-Superior, volume 2.
- Geiger DL, Poirier SH, Brooke LT, Call DJ. 1986. Acute toxicities of organic chemicals to fathead minnows (*Pimephales promelas*). Superior, WI, USA: Centre for Lake Superior Environmental Studies, University of Wisconsin-Superior, volume 3.
- Geiger DL, Brooke LT, Call DJ. 1988. Acute toxicities of organic chemicals to fathead minnows (*Pimephales promelas*). Superior, WI, USA: Centre for Lake Superior Environmental Studies, University of Wisconsin-Superior, volume 4.
- Geiger DL, Brooke LT, Call DJ. 1990. Acute toxicities of organic chemicals to fathead minnows (*Pimephales promelas*). Superior, WI, USA: Centre for Lake Superior Environmental Studies, University of Wisconsin-Superior, volume 5.
- German Chemical Society, GDCh-Advisory Committee on Existing Chemicals of Environmental Relevance (BUA) Report 31, 2,4-dichlorophenol, 1988.
- Gersich FM, Blanchard FA, Applegath SL, Park CN. 1986. The precision of Daphnid (*Daphnia magna* Straus, 1820) static acute toxicity tests. Arch Environ Contam Toxicol 15 (6): 741-749.

- Gersich FM, Milazzo DP. 1988. Chronic toxicity of aniline and 2,4-dichlorophenol to *Daphnia magna* Straus. Bull Environ Contam Toxicol 40: 1-7.
- Geyer H, Scheunert I, Korte F. 1985. The effects of organic environmental chemicals on the growth of the alga *Scenedesmus subspicatus*; a contribution to environmental biology. Chemosphere 14 (9): 1355-1369.
- Gledhill WE, Kaley RG, Adams WJ, Hicks O, Michael PR, Saeger VW, LeBlanc GA. 1980. An environmental safety assessment of butyl benzyl phthalate. Environ Sci Technol 14 (3): 301-305.
- Green DWJ, Williams KA, Pascoe D. 1985. Studies on the acute toxicity of pollutants to freshwater macroinvertebrates. 2. Phenol Arch Hydrobiol 103 (1): 75-82.
- Gupta PK, Rao PS. 1982. Toxicity of phenol, pentachlorophenol and sodium pentachlorophenate to a freshwater pulmonate snail *Lymnaea acuminata* (Lamarck). Arch Hydrobiol 94 (2): 210-217.
- Gupta PK, Mujumdar VS, Rao PS, Durve VS. 1982. Toxicity of phenol, pentachlorophenol, and sodium pentachlorophenate to a freshwater teleost *Lebistes reticulatus* (Peters). Acta Hydrochim Hydrobiol 10 (2): 177-181.
- Hall LH, Kier LB, Phipps G. 1984. Structure-activity relationship studies on the toxicities of benzene derivatives: I. An additivity model. Environ Toxicol Chem 3: 355-365.
- Hall LH, Kier LB. 1984. Molecular connectivity of phenols and their toxicity to fish. Bull Environ Contam Toxicol 32: 354-362.
- Heimbach F. 1984. Correlations between three methods for determining the toxicity of chemicals to earthworms. Pestic Sci 15: 605-611.
- Heitmuller PT, Hollister TA, Parrish PR. 1981. Acute toxicity of 54 industrial chemicals to sheepshead minnows (*Cyprinodon variegatus*). Bull Environ Contam Toxicol 27: 596-604.
- Heming TA, Thurston RV, Meyn EL, Zajdel RK. 1985. Acute toxicity of thiocyanate to trout. Trans Am Fish Soc 114: 895-905.
- Heming TA, Blumhagen KA. 1989. Factors influencing thiocyanate toxicity in rainbow trout *Salmo gairdneri*. Bull Environ Contam Toxicol 43: 363-369.
- Hermens J, Canton H, Steyger N, Wegman R. 1984. Joint effects of a mixture of 14 chemicals on mortality and inhibition of reproduction of *Daphnia magna*. Aquat Toxicol 5: 315-322.
- Herring R, Bering CL. 1988. Effects of phthalate esters on plant seedlings and reversal by soil microorganism. Bull Environ Contam Toxicol 40: 626-632.
- Hickey CW, Martin ML. 1995. Relative sensitivity of five benthic invertebrate species to reference toxicants and resin-acid contaminated sediments. Environ Toxicol Chem 14 (8): 1401-1409.
- Hodson PV, Dixon DG, Kaiser KLE. 1984. Measurement of median lethal dose as a rapid indication of contaminant toxicity to fish. Environ Toxicol Chem 3: 243-254.
- Holcombe GW, Phipps GL, Sulaiman AH, Hoffman AD. 1987. Simultaneous multiple species testing: acute toxicity of 13 chemicals to 12 diverse freshwater amphibian, fish, and invertebrate families. Arch Environ Contam Toxicol 16: 697-710.
- Hooftman RN, Vink GJ. 1980. The determination of toxic effects of pollutants with the marine polychaete worm *Ophryotrocha diadema*. Ecotoxicol Environ Saf 4: 252-262.
- Hooftman RN, Janssen JMA. 1986. Evaluation of the impact of 1-chloronaphthalene and chloronaphthalenes (technical mixture) on the aquatic environment. TNO report no. R86/143a and 196a.
- Hulzebos EM, Adema DMM, Dirven-van Breemen EM, Henzen L, Van Dis WA, Herbold HA, Hoekstra JA, Baerselman R, Van Gestel CAM. 1993. Phytotoxicity studies with *Lactuca sativa* in soil and nutrient solution. Environ Toxicol Chem 12: 1079-1094.

- Janssen CR, Ferrando MD, Persoone G. 1994. Ecotoxicological studies with the freshwater rotifer *Brachionus calyciflorus* IV. Rotifer behavior as a sensitive and rapid sublethal test criterion. *Ecotoxicol Environ Saf* 28: 244-255.
- Juhnke I, Lüdemann D. 1978. Ergebniss der Untersuchung von 200 chemischen Verbindungen auf akute Fischtoxizität mit dem Goldorfentest. *Z f Wasser- und Abwasser-Forsch* 11 (5): 161-164.
- Keen R, Baillod CR. 1985. Toxicity to *Daphnia* of the end products of wet oxidation of phenol and substituted phenols. *Wat Res* 19 (6): 767-772.
- Kevan SD, Dixon DG. 1991. The acute toxicity of pulse-dosed thiocyanate (as KSCN and NaSCN) to rainbow trout (*Oncorhynchus mykiss*) eggs before and after water hardening. *Aquat Toxicol* 19: 133-122.
- Kevan SD, Dixon DG. 1996. Effects of age and co ion (K and Na) on the toxicity of thiocyanate to rainbow trout (*Oncorhynchus mykiss*) during pulse or continuous exposure. *Ecotoxicol Environ Saf* 35: 288-293.
- Key PB, Scott GI. 1986. Lethal and sublethal effects of chlorine, phenol, and chlorine-phenol mixtures on the mud crab *Panopaeus herbstii*. *Environ Health Perspect* 69: 307-312.
- Kimball GL, Smith LL, Broderius SJ. 1978. Chronic toxicity of hydrogen cyanide to the bluegill. *Trans Am Fish Soc* 107 (2): 341-345.
- Klecka GM, Landi LP. 1985. Evaluation of the OECD activated sludge, respiration inhibition test. *Chemosphere* 14 (9): 1239-1251.
- Knie J, Halke A, Juhnke I, Schiller W. 1983. Ergebnisse der untersuchungen von chemischen stoffen mit vier biotests. *Deutsche Gewass Mitt* 3: 77-79.
- Knowles CO, McKee MJ, Palawski DU. 1987. Chronic effects of di-2-ethylhexyl phthalate on biochemical composition, survival and reproduction of *Daphnia magna*. *Environ Toxicol Chem* 6: 201-208.
- Kobayashi K, Akitake H, Manabe K. 1979. Relation between toxicity and accumulation of various chlorophenols in goldfish. *Bull Japan Soc Sci Fish* 45 (2): 173-175.
- Koenst WM, Smith Jr. LL, Broderius SJ. 1977. Effect of chronic exposure of brook trout to sublethal concentrations of hydrogen cyanide. *Environ Sci Technol* 11(9): 883-886.
- Könemann H, Musch A. 1981. Quantitative structure-activity relationships in fish toxicity studies. Part 2: The influence of pH on the QSAR of chlorophenols. *Toxicology* 19: 223-228.
- Kovacs TG, Leduc G. 1982. Acute toxicity of cyanide to rainbow trout (*Salmo gairdneri*) acclimated ot different temperatures. *Can J Fish Aquat Sci* 39: 1426-1429.
- Kühn R, Pattard M, Pernak K-D, Winter A. 1989. Results of the harmful effects of selected water pollutants (anilines, phenols, aliphatic compounds) to *Daphnia magna*. *Wat Res* 23 (4): 495-499.
- Kühn R, Pattard M. 1990. Results of the harmful effects of water pollutants to green algae (*Scenedesmus subspicatus*) in the cell multiplication inhibition test. *Wat Res* 24 (1): 31-38.
- Lanno RP, Dixon DG. 1994. Chronic toxicity of waterborne thiocyanate to the fathead minnow (*Pimephales promelas*): A partial life-cycle study. *Environ Toxicol Chem* 13(9): 1423-1432.
- Lanno RP, Dixon DG. 1996a. Chronic toxicity of waterborne thiocyanate to rainbow trout (*Oncorhynchus mykiss*). *Can J Fish Aquat Sci* 53: 2137-2146.
- Lanno RP, Dixon DG. 1996b. The comperative chronic toxicity of thiocyanate and cyanide to rainbow trout. *Aquat Toxicol* 36: 177-187.
- Laughlin Jr. RB, Neff JM, Hrung YC, Goodwin TC, Giam CS. 1978. Effects of three phthalate esters on the larval development of the grass shrimp *Palaemonetes pugio* (Holthuis). *Water, Air, Soil Pollut* 9: 323-336.

- LeBlanc GA. 1980. Acute toxicity of priority pollutants to water flea (*Daphnia magna*). Bull Environ Contam Toxicol 24: 684-691.
- LeBlanc GA. 1984. Interspecies relationships in acute toxicity of chemicals to aquatic organisms. Environ Toxicol Chem 3: 47-60.
- Leduc G. 1977. Deleterious effects of cyanide on early life stages of Atlantic salmon (*Salmo salar*). J Fish Res Board Can 35: 166-174.
- Lee S, Na E-J, Cho Y-O, Koopman B, Bitton G. 1997. Short-term toxicity test based on algal uptake by *Ceriodaphnia dubia*. Water Environ Res 69(7): 1207-1210.
- Lee WY, Nicol JAC. 1978. Individual and combined toxicity of some petroleum aromatics to the marine amphipod *Elasmopus pecteniscus*. Marine Biol 48: 215-222.
- Liber K, Solomon KR. 1994. Acute and chronic toxicity of 2,3,4,6-tetrachlorophenol and pentachlorophenol to *Daphnia* and rotifers. Arch Environ Contam Toxicol 26: 212-221.
- Lilius H, Isomaa B, Holmström T. 1994. A comparison of the toxicity of 50 reference chemicals to freshly isolated rainbow trout hepatocytes and *Daphnia magna*. Aquat Toxicol 30: 47-60.
- Lind DT, Smith LL, Broderius SJ. 1977. Chronic effects of hydrogen cyanide on the fathead minnow. J WPCF february: 262-268.
- Linden E, Bengtsson BE, Svanverg O, Sundstrom G. 1979. The acute toxicity of 78 chemicals and pesticide formulations against two brackish water organisms, the bleak (*Alburnus alburnus*) and the harpacticoid *Nitocra spinipes*. Chemosphere 11/12: 843-851.
- Little EE, Archeski RD, Flerov BA, Kozlovskaya VI. 1990. Behavioral indicators of sublethal toxicity in rainbow trout. Arch Environ Contam Toxicol 19: 380-385.
- Liu D, Thomson K, Kaiser KLE. 1982. Quantitative structure-toxicity relationship of halogenated phenols on bacteria. Bull Environ Contam Toxicol 29: 130-136.
- Lussier M, Gentile JH, Walker J. 1985. Acute and chronic effects of heavy metals and cyanide on *Mysidopsis bahia* (Crustacea: Mysidacea). Aquat Toxicol 7: 25-35.
- Mayes MA, Alexander HC, Dill DC. 1983. A study to assess the influence of age on the response of fathead minnows in static acute toxicity tests. Bull Environ Contam Toxicol 31: 139-147.
- McCarthy JF, Whitmore DK. 1985. Chronic toxicity of di-n-butyl and di-n-octylphthalate to *Daphnia magna* and the fathead minnow. Environ Toxicol Chem 4: 167-179.
- McCaffrey JP, Williams III L, Borek V, Brown PD, Morra MJ. 1995. Toxicity of ionic thiocyanate amended soil to the wireworm *Limoniuss californicus* (Coleoptera Elaterida). J Econ Entomol 88 (4): 793-797.
- McGeachy SM, Leduc G. 1988. The influence of season and exercise on the lethal toxicity of cyanide to rainbow trout (*Salmo gairdneri*). Arch Environ Contam Toxicol 17: 313-318.
- McLeese DW, Zitko V, Peterson MR. 1979. Structure-lethality relationships for phenols, anilines, and other aromatic compounds in shrimp and clams. Chemosphere 2: 53-57.
- Meghara M, Singleton I, McClure NC. 1998. Effect of pentachlorophenol pollution towards microalgae and microbial activities in soil from a former timber processing facility. Bull Environ Contam Toxicol 61: 108-115.
- Milleman RE, Birge WJ, Black JA, Cushman RM, Daniels KL, Franco PJ, Giddings JM, McCarthy JF, Stewart AJ. 1984. Comparative acute toxicity to aquatic organisms of components of coal derived synthetic fuels. Trans Am Fish Soc 113: 74-85.
- Nalecz-Jawecki G, Sawicki J. 1998. Toxicity of inorganic compounds in the spirotox test: A miniaturized version of the *Spirostomum ambiguum* test. Arch Environ Contam Toxicol 34: 1-5.

- Nendza M, Seydel JK. 1988. Quantitative structure-toxicity relationships for ecotoxicologically relevant biotest systems and chemicals. *Chemosphere* 17 (8): 1585-1602.
- Neuhauser EF, Loehr RC, Malecki MR, Milligan DL, Durkin PR. 1985. The toxicity of selected organic chemicals to the earthworm *Eisenia fetida*. *J Environ Qual* 14 (3): 383-388.
- Norberg-King TJ. 1989. An evaluation of the fathead minnow seven-day subchronic test for estimating chronic toxicity. *Environ Toxicol Chem* 8: 1075-1089.
- Oikari A, Kukkonen J, Virtanen V. 1992. Acute toxicity of chemicals to *Daphnia magna* in humic waters. *Sci Total Environ* 117/118: 367-377.
- Oksama M, Kristoffersson R. 1979. The toxicity of phenol to *Phoxinus phoxinus*, *Gammarus duebeni* and *Mesidotea entomon* in brackish water. *Ann Zool Fennici* 16: 209-216.
- Oris JT, Winner RW, Moore MV. 1991. A four-day survival and reproduction toxicity test for *Ceriodaphnia dubia*. *Environ Toxicol Chem* 10: 217-224.
- Ozretich RJ, Randall RC, Boese BLJ, Schroeder WP, Smith JR. 1983. Acute toxicity of butylbenzyl phthalate to shiner perch (*Cymatogaster aggregata*). *Arch Environ Contam Toxicol* 12: 655-660.
- Pablo F, Buckney RT, Lim RP. 1997a. Toxicity of cyanide, iron-cyanide complexes and blast furnace effluent to larvae of the dougby scallop, *Chlamys asperrimus*. *Bull Environ Contam Toxicol* 58: 93-100.
- Pablo F, Buckney RT, Lim RP. 1997b. Toxicity of cyanide, iron-cyanide complexes and a blast-furnace effluent to the banana prawn, *Penaeus monodon*. *Bull Environ Contam Toxicol* 58: 822-829.
- Pablo F, Stauber JL, Buckney RT. 1997c. Toxicity of cyanide and cyanide complexes to the marine diatom *Nitzschia closterium*. *Wat Res* 31(10): 2435-2442.
- Palau-Casellas A, Hutchinson TH. 1998. Acute toxicity of chlorinated organic chemicals to the embryos and larvae of the marine worm *Platynereis dumerilii* (Polychaeta: Nereidae). *Environ Toxicol Water Qual* 13: 149-155.
- Parker JG. 1984. The effects of selected chemicals and water quality on the marine polychaete *Ophryotrocha diadema*. *Wat Res* 18 (7): 865-868.
- Parkhurst BR, Bradshaw AS, Forte JL, Wright GP. 1979. An evaluation of the acute toxicity to aquatic biota of a coal conversion effluent and its major components. *Bull Environ Contam Toxicol* 23: 349-356.
- Parrish PR, Dyar EE, Enos JM, Wilson WG. 1978. Chronic toxicity of chlordane, trifluralin, and pentachlorophenol to sheepshead minnows (*Cyprinodon variegatus*). *Ecol Res* 23, 28, 49, 50.
- Pauli W, Berger S, Jaskulka L, Schmitz S. 1993. A case for the inclusion of a protozoan test in aquatic toxicity assessment using *Tetrahymena*. *Sci Total Environ, Suppl. 1*: 779-786.
- Phipps GL, Holcombe GW, Fiandt JT. 1981. Acute toxicity of phenol and substituted phenols to the fathead minnow. *Bull Environ Contam Toxicol* 26: 585-593.
- Pickering QH, Henderson C. 1966. Acute toxicity of some important petrochemicals to fish. *J Water Pollut. Control Fed* 38 (9): 1419-1429.
- Pill KG, Kupillas GE, Picardal FW, Arnold RG. 1991. Estimating the toxicity of chlorinated organic compounds using a multiparameter bacterial bioassay. *Environ Toxicol Water Qual Internat J* 6: 271-291.
- Price KS, Waggy GT, Conway RA. 1974. Brine shrimp bioassay and seawater BOD of petrochemicals. *J Water Pollut Control Fed* 46 (1): 63-77.
- Rama Rao SV, Nath KJ. 1983. Biological effect of some poisons on *Canthocamptus* (crustacea spp.). *Int J Environ Studies* 21: 271-275.

- Randall TL, Knopp PV. 1980. Detoxification of specific organic substances by wet oxidation. J Water Pollut Control Fed 52 (8): 2117-2130.
- Randall RC, Ozretich R.J, Boese BL. 1983. Acute toxicity of butylbenzyl phthalate to the saltwater fish English sole, *Parophrys vetulus*. Environ Sci Technol 17: 670-672.
- Rao PS, Durve VS, Khangarot BS, Shekhawat SS. 1983. Acute toxicity of phenol, pentachlorophenol and sodium pentachlorophenate to a freshwater ostracod *Cypris subglobosa* (Sowerby). Acta Hydrochim Hydrobiol 11 (4): 457-465.
- Razani H, Nanba K, Murachi S. 1986. Acute toxic effect of phenol on zebrafish *Brachydanio rerio*. Bull Jap Soc Sci Fish 52 (9): 1547-1552.
- Rhodes JE, Adams WJ, Biddinger GR, Robillard KA, Gorsuch JW. 1995. Chronic toxicity of 14 phthalate esters to *Daphnia magna* and rainbow trout (*Oncorhynchus mykiss*). Environ Toxicol Chem 14 (11): 1967-1976.
- Ribo JM, Kaiser KLE. 1983. Effects of selected chemicals to photoluminescent bacteria and their correlations with acute and sublethal effects on other organisms. Chemosphere 12 (11/12): 1421-1442.
- Ruby SM, Dixon DG, Leduc G. 1979 Inhibition of spermatogenesis in rainbow trout during chronic cyanide poisoning. Arch Environ Contam Toxicol 8: 533-544.
- Saarikoski J, Viluksela M. 1981. Influence of pH on the toxicity of substitutes phenols to fish. Arch Environ Contam Toxicol 10: 747-753.
- Sarkar SK. 1990. Toxicity evaluation of sodium cyanide to fish and aquatic organisms: Effects of temperature. Sci Cult 56 (4): 165-168.
- Schäfer H, Hettler H, Fritsche E, Pitzen G, Röderer G, Wenzel A. 1994. Biotests using unicellular algae and ciliates for predicting long-term effects of toxicants. Ecotoxicol Environ Saf 27: 64-81.
- Schultz TW, Holcombe G, Phipps GL. 1986. Relationships of quantitative structure-activity to comparative toxicity of selected phenols in the *Pimephales promelas* and *Tetrahymena pyriformis* test systems. Ecotoxicol Environ Saf 12: 146-153.
- Schultz TW, Riggin GW, Wesley SK. 1987. Structure-activity relationships for parasubstituted phenols. In: Kaiser, K.L.E. ed. QSAR in environmental toxicology – II. Dordrecht, The Netherlands: D. Reidel Publishing Company, pp 333-345.
- Shehata SA, Sohair AE, Gamila A. 1988. Effect of cyanide on selected Nile water algae. Environ Technol Lett 9 (10): 1137-1146.
- Shigeoka T, Sato Y, Takeda Y. 1988. Acute toxicity of chlorophenols to green algae, *Selenastrum capricornutum* and *Chlorella vulgaris*, and quantitative structure-activity relationships. Environ Toxicol Chem 7: 847-854.
- Slabbert JL. 1986. Improved bacterial growth test for rapid water toxicity screening. Bull Environ Contam Toxicol 37: 565-569.
- Slooff W. 1979. Detection limits of a biological monitoring system based on fish respiration. Bull Environ Contam Toxicol 23: 517-523.
- Slooff W, Baerselman R. 1980. Comparison of the usefulness of the mexican axolotl (*Ambystoma mexicanum*) and the clawed toad (*Xenopus laevis*) in toxicological bioassays. Bull Environ Contam Toxicol 24: 439-443.
- Slooff W. 1983. Benthic macroinvertebrates and water quality assessment: some toxicological considerations. Aquat Toxicol 4: 73-82.
- Slooff W, Canton JH. 1983. Comparison of the susceptibility of 11 freshwater species to 8 chemical compounds. II. (Semi)chronic toxicity tests. Aquat Toxicol 4: 271-282.
- Slooff W, Canton JH, Hermens JLM. 1983. Comparison of the susceptibility of 22 freshwater species to 15 chemical compounds. I. (sub)acute toxicity tests. Aquat Toxicol 4: 113-128.

- Smith LL, Broderius SJ, Oseid DM, Kimball GL, Koenst WM. 1978. Acute toxicity of hydrogen cyanide to freshwater fishes. *Arch Environ Contam Toxicol* 7: 325-337.
- Smith AD, Bharath A, Mallard C, Orr D, Smith K, Sutton JA, Vukmanich J, McCarty LS, Ozburn GW. 1991. The acute and chronic toxicity of ten chlorinated organic compounds to the American flagfish (*Jordanella floridae*). *Arch Environ Contam Toxicol* 20: 94-102.
- Solbé JF de, Cooper VA, Willis CA, Mallett MJ. 1985. Effects of pollutants in fresh waters on European non-salmonid fish. I: Non-metals. *J Fish Biol*: 27 (Suppl. A): 197-207.
- Speyer MR, Raymond P. 1988. The acute toxicity of thiocyanate and cyanate to rainbow trout as modified by water temperature and pH. *Environ Toxicol Chem* 7: 565-571.
- Staples CA, Adams WJ, Parkerton TF, Gorsuch JW, Biddinger GR, Reinert KH. 1997. Aquatic toxicity of eighteen phthalate esters. *Environ Toxicol Chem* 16 (5): 875-891.
- Stephenson RR. 1983. Effects of water hardness, water temperature, and size of test organism on the susceptibility of the freshwater shrimp, *Gammarus pulex* (L.), to toxicants. *Bull Environ Contam Toxicol* 31: 459-466.
- Stom DI, Roth R. 1981. Some effects of polyphenols on aquatic plants: I. Toxicity of phenols in aquatic plants. *Bull Environ Contam Toxicol* 27: 332-337.
- Tisler T, Zagorc-Koncan J. 1997. Comparative assessment of toxicity of phenol, formaldehyde, and industrial wastewater to aquatic organisms. *Water, Air, Soil Pollut* 97: 315-322.
- Tscheu-Slüter M, Skibba WD. 1986. Vergleichende aquatotoxikologische Ergebnisse mit ausgewählten Wasserschadstoff-Gruppen und repräsentativen Wasserorganismen. *Acta Hydrochim Hydrobiol* 14 (6): 627-641.
- Vaishnav DD, Korthals ET. 1990. Comparative toxicities of selected industrial chemicals to microorganisms and other aquatic organisms. *Arch Environ Contam Toxicol* 19: 624-628.
- Van Beelen P, Fleuren-Kemilå AK, Huys MPA., Van Montfort ACP, Van Vlaardingen PLA. 1991. The toxic effects of pollutants on the mineralization of acetate in subsoil microcosms. *Environ Toxicol Chem* 10: 775-789.
- Van Beelen P, Fleuren-Kemila AK. 1993. Toxic effects of pentachlorophenol and other pollutants on the mineralization of acetate in several soils. *Ecotoxicol Environ Saf* 26: 10-17.
- Van Beelen P, Fleuren-Kemilå AK, Van Mil CHM. 1994. Stimulatory and toxic effects of acid, pentachlorophenol or zinc on the mineralization of acetate in acid or calcareous soils and subsoils. *J Environ Sci Health A29*, 7: 1391-1408.
- Van Gestel CAM, Van Dis WA. 1988. The influence of soil characteristics on the toxicity of four chemicals to the earthworm *Eisenia fetida andrei* (Oligochaeta). *Biol Fertil Soils* 6: 262-265.
- Van Gestel CAM, Van Dis WA, Van Breemen EM, Sparenburg PM. 1989. Development of a standardized reproduction toxicity study with the earthworm species *Eisenia fetida* using copper, pentachlorophenol, and 2,4-dichloroaniline. *Ecotoxicol Environ Saf* 18: 305-312.
- Van Gestel CAM, Ma W-C. 1990. An approach to quantitative structure-activity relationships (QSARs) in earthworm toxicity studies. *Chemosphere* 21 (8): 1023-1033.
- Van Gestel CAM, Van Dis WA, Dirven-van Breemen EM, Sparenburg PM, Baerselman R. 1991. Influence of cadmium, copper, and pentachlorophenol on growth and sexual development of *Eisenia andrei* (Oligochaeta; Annelida). *Biol Fertil Soils* 12: 117-121.
- Van Gestel CAM, Adema DMM, Dirven-van Breemen EM. 1996. Phytotoxicity of some chloroanilines and chlorophenols, in relation to bioavailability in soil. *Water, Air, Soil Pollut* 88: 119-132.

- Van Leeuwen CJ, Griffioen PS, Vergouw WHA, Maas-Diepeveen JL. 1985. Differences in susceptibility of early life stages of rainbow trout (*Salmo gairdneri*) to environmental pollutants. *Aquat Toxicol* 7: 59-78.
- Van Leeuwen CJ, Grootelaar EMM, Niebeek G. 1990. Fish embryos as teratogenicity screens: A comparison of embryotoxicity between fish and birds. *Ecotoxicol Environ Saf* 20: 42-52.
- Verma SR, Rani S, Tyagi AK, Dalela RC. 1980. Evaluation of acute toxicity of phenol and its chloro- and nitro-derivatives to certain teleosts. *Water, Air, Soil Pollut* 14: 95-102.
- Wang W. 1990. Literature review on duckweed toxicity testing. *Environ Res* 52 (1) 7-22.
- Ward GS, Parrish PR. 1981. Early life stage toxicity tests with a saltwater fish: effects of eight chemicals on survival, growth, and development of sheepshead minnows (*Cyprinodon variegatus*). *J Toxicol Environ Health* 8: 225-240.
- Warne MStJ, Connell DW, Hawker DW. 1989. The ecotoxicology of shale oil components to marine bacteria. *Wat Sci Technol* 21 (2): 135-139.
- Watson SJ, Maly EJ. 1987. Thiocyanate toxicity to *Daphnia magna*: modified by pH and temperature. *Aquat Toxicol* 10: 1-8.
- Wellens H. 1982. Vergleich der Empfindlichkeit von *Brachydanio rerio* und *Leuciscus idus* bei der Untersuchung der Fischtoxizität von chemischen Verbindungen und Abwässern. *Z f Wasser- und Abwasser-Forsch* 15 (2): 49-52.
- Wilson WB, Giam CS, Goodwin TE, Aldrich A, Carpenter V, Hrungr YC. 1978. The toxicity of phthalates to the marine dinoflagellate *Gymnodinium breve*. *Bull Environ Contam Toxicol* 20: 149-154.
- Zhang T, Hongjun J. 1997. Use of duckweed (*Lemna minor*) growth inhibition test to evaluate the toxicity of acrylonitrile, sulphocyanic sodium and acetonitrile in China. *Environ Pollut* 98 (2): 143-147.
- Zhang T, Zhu HI, Jin HJ. 1998. Deriving freshwater quality criteria of sulfocyanic sodium for the protection of aquatic life in China. *J Environ Sci* 10 (2): 151-158.
- Zhao Y-H, Wang L-S. 1993. Quantitative structure-activity relationships - Relationship between toxicity of organic chemicals to fish and to *Photobacterium phosphoreum*. *Chemosphere* 26 (11): 1971-1979.

Additional evaluated references

- Acey R, Healy P, Unger TF, Ford CE, Hudson RA. 1987. Growth and aggregation behaviour of representative phytoplankton as affected by the environmental contaminant di-n-butyl phthalate. *Bull Environ Contam Toxicol* 39: 1-6.
- Alekseyev VA, Uspenskaya NYE. 1974. A toxicological description of acute phenolic poisoning of certain freshwater worms. *Hydrobiol J* 10: 35-41.
- Anderson SL, Hose JE, Knezovich JP. 1994. Genotoxic and developmental effects in sea urchins are sensitive indicators of effects of genotoxic chemicals. *Environ Toxicol Chem* 13 (7): 1033-1041.
- Arambasic MB, Bjelic S, Subakov G. 1995. Acute toxicity of heavy metals (copper, lead, zinc), phenol and sodium on *Allium Cepa* L., *Lepidum sativum* L. and *Daphnia magna* St.: Comparative investigation and the practical applications. *Wat Res* 29 (2): 497-503.
- Bahnick DA, Doucette WJ. 1988. Use of molecular connectivity indices to estimate soil sorption coefficients for organic chemicals. *Chemosphere* 17 (9): 1703-1715.
- Blum DJW, Speece RE. 1991. A database of chemical toxicity to environmental bacteria and its use in interspecies comparisons and correlations. *Res J Water Pollut Control Fed* 63: 198-207.

- Bradbury SP, Henry TR, Niemi GJ, Carlson RW, Snarski VM. 1989. Use of respiratory-cardiovascular responses of rainbow trout (*Salmo gairdneri*) in identifying acute toxicity syndromes in fish: Part 3. Polar narcosis. *Environ Toxicol Chem* 8: 247-261.
- Brock Neely W. 1984. An analysis of aquatic toxicity data: water solubility and acute LC50 fish data. *Chemosphere* 13 (7): 813-819.
- Brown D, Thompson RS. 1982. Phthalates and the aquatic environment: Part I. The effect of di-2-ethylhexyl phthalate (DEHP) and di-isodecyl phthalate (DIDP) on the reproduction of *Daphnia magna* and observations on their bioconcentration. *Chemosphere* 11: 417-426.
- Buikema Jr. AL. 1979. Phenolics in aquatic ecosystems: a selected reviews of recent literature. *Mar Environ Res* 2: 87-181.
- Burback BL, Perry JJ, Rudd LE. 1994. Effect of environmental pollutants and their metabolites on a soil mycobacterium. *Appl Microbiol Biotechnol* 41: 134-136.
- De Rosa S, De Guilio A, Iodice C. 1994. Biological effects of prenylated hydroquinones: Structure-activity relationship studies in antimicrobial, brine shrimp and fish lethality assays. *J Natural Prod* 57 (12): 1711-1716.
- Dean-Ross D, Rahimi M. 1995. Toxicity of phenolic compounds to sediment bacteria. *Bull Environ Contam Toxicol* 55: 245-250.
- Devillers J. 1988. Acute toxicity of cresols, xylenols, and trimethylphenols to *Daphnia magna* Straus 1820. *Sci Total Environ* 76: 79-83.
- De Zwaan A, Eertman RHM. 1996. Anoxic or aerial survival of bivalves and other euryoxic invertebrates as a useful response to environmental stress - A comprehensive review. *Comp Biochem Physiol, C: Pharmacol Toxicol Endocrinol* 113C, 2: 299-312.
- Dyreborg S, Arvin E. 1995. Inhibition of nitrification by creosote-contaminated water. *Wat Res* 29 (6): 1603-1606.
- Eastmond DA, Booth GM, Lee ML. 1984. Toxicity, Accumulation and Elimination of polycyclic aromatic sulfur heterocycles in *Daphnia magna*. *Arch Environ Contam Toxicol* 13: 105-111.
- Ferrando MD, Andreu-Moliner E. 1991. Acute lethal toxicity of some pesticides to *Brachionus calyciflorus* and *Brachionus plicatilis*. *Bull Environ Contam Toxicol* 47: 479-484.
- Ferrando MD, Janssen CR, Andreu E, Persoone G. 1993. Ecotoxicological studies with the freshwater rotifer *Brachionus calyciflorus*. III. The effects of chemicals on the feeding behavior. *Ecotoxicol Environ Saf* 26: 1-9.
- Fitzgerald DG, Lanno RP, Klee U, Farwell A, Dixon DG. 1997. Critical body residues (CBRs): Applications in the assessment of pentachlorophenol toxicity to *Eisenia fetida* in artificial soil. *Soil Biol Biochem* 29 (3/4): 685-688.
- Geetha Singh B, Agrawal SC. 1987. Influence of organic volatile compounds on the growth of certain keratophilic fungi. *Curr Sci* 56 (6): 271-274.
- Group Jr. EF. 1986. Environmental fate and aquatic toxicology studies on phthalate esters. *Environ Health Perspect* 65: 337-350.
- Hartenstein R. 1982. Effect of aromatic compounds, humic acids and lignins on growth of the earthworm *Eisenia foetida*. *Soil Biol Biochem* 14: 595-599.
- Hattula ML, Wasenius VM, Reunanen H, Arstila AU. 1981. Acute toxicity of some chlorinated phenols, catechols and cresols to trout. *Bull Environ Contam Toxicol* 26: 295-298.
- Hermens J, Balaz S, Damborsky J, Karcher W, Müller M, Peijnenburg W, Sabljic A, Sjöström M. 1995. Assessment of QSARs for predicting fate and effects of chemicals in the environment: An international European project. *SAR QSAR Environ Res* 3: 223-236.

- Hoke RA, Giesy JP, Zabik M, Unger M. 1993. Toxicity of sediments and sediment pore waters from the Grand Calumet River- Indiana Harbor, Indiana area of concern. *Ecotoxicol Environ Saf* 26: 86-112
- Huang JC, Gloyna EF. 1968. Effect of organic compounds on photosynthetic oxygenation-I. Chlorophyll destruction and suppression of photosynthetic oxygen production. *Wat Res* 2: 347-366.
- Jagoe RH, Newman MC. 1997. Bootstrap estimation of community NOEC values. *Ecotoxicology* 6: 293-306.
- Jaworska JS, Schultz TW. 1991. Comparative toxicity and structure-activity in *Chlorella* and *Tetrahymena*: Monosubstituted phenols. *Bull Environ Contam Toxicol* 47: 57-62.
- Kaiser KLE, Esterby SR. 1991. Regression and cluster analysis of the acute toxicity of 267 chemicals to six species of biota and the octanol/water partition coefficient. *Sci Total Environ* 109/110: 499-514.
- Kenaga EE. 1980. Correlation of bioconcentration factors of chemicals in aquatic and terrestrial organisms with their physical and chemical properties. *Environ Sci Technol* 14 (5): 553-556.
- Kuivasniemi K, Eloranta V, Knuutinen J. 1985. Acute toxicity of some chlorinated phenolic compounds to *Selenastrum capricornutum* and phytoplankton. *Arch Environ Contam Toxicol* 14: 43-49.
- Lewis MA. 1983. Effect of loading density on the acute toxicities of surfactants, copper, and phenol to *Daphnia magna* Straus. *Arch Environ Contam Toxicol* 12: 51-55.
- Lipnick RL, Watson KR, Strausz AK. 1987. A QSAR study of the acute toxicity of some industrial organic chemicals to goldfish. Narcosis, electrophile and proelectrophile mechanisms. *Xenobiotica* 17 (8): 1011-1025.
- Mayer Jr. FL, Stalling DL, Johnson JL. 1972. Phthalate esters as environmental contaminants. *Nature* 238: 411-413.
- Megharaj M, Pearson HW, Venkateswarlu K. 1991. Toxicity of phenol and three nitrophenols towards growth and metabolic activities of *Nostoc linckia*, isolated from soil. *Arch Environ Contam Toxicol* 21: 578-584.
- Mekenyan OG, Bonchev DG. 1988. Modeling the interaction of small organic molecules with biomacromolecules (the Oasis approach) V. Toxicity of phenols to algae "*Lemna minor*". *Quant Struct-Act Relat* 7: 240-244.
- Murty AS, Kondaiah K. 1991. Standard test fish for India and the neighbouring countries. *Bull Environ Contam Toxicol* 46: 871-878.
- Nendza M, Klein W. 1990. Comparative QSAR study on freshwater and estuarine toxicity. *Aquat Toxicol* 17: 63-74.
- Perez JA, Downs JE, Brown PJ. 1976. Effects of dimethyl phthalate on growth of *Pseudomonas aeruginosa*. *Bull Environ Contam Toxicol* 16: 486-490.
- Russom CL, Bradbury SP, Broderius ST, Hammermeister DE, Drummond RA. 1997. Predicting modes of toxic action from chemical structure: Acute toxicity in the fathead minnow (*Pimephales promelas*). *Environ Toxicol Chem* 16 (5): 948-967.
- Saarikoski J, Viluksela M. 1982. Relation between physicochemical properties of phenols and their toxicity and accumulation in fish. *Ecotoxicol Environ Saf* 6: 501-512.
- Saito H, Koyasu J, Yoshida K, Shigeoka T, Koike S. 1993. Cytotoxicity of 109 chemicals to goldfish GFS cells and relationships with 1-octanol/water partition coefficients. *Chemosphere* 26 (5): 1015-1028.
- Salminen J, Haimi J, Sironen A, Ahtiainen J. 1995. Effects of pentachlorophenol and biotic interactions on soil fauna and decomposition in humus soil. *Ecotoxicol Environ Saf* 31: 250-257.

- Salminen J, Haimi J. 1996. Effects of pentachlorophenol in forest soil: A microcosm experiment for testing ecosystem responses to anthropogenic stress. *Biol Fertil Soils* 23: 182-188.
- Salminen J, Haimi J. 1997. Effects of pentachlorophenol on soil organisms and decomposition in forest soil. *J Appl Ecol* 34: 101-110.
- Samoiloff MR, Schultz S, Jordan Y, Denich K, Arnott E. 1980. A rapid simple long-term toxicity assay for aquatic contaminants using the nematode *Panagrellus redivivus*. *Can J Fish Aquat Sci* 37: 1167-1174.
- Santojanni A, Gorbi G, Sartore F. 1995. Prediction of mortality in chronic toxicity tests on *Daphnia magna*. *Wat. Res* 29 (6): 1453-1459.
- Scheunert I, Attar A, Zelles L. 1995. Ecotoxicological effects of soil-bound pentachlorophenol residues on the microflora of soils. *Chemosphere* 30 (10): 1995-2009.
- Schönborn W, Dumpert K. 1990. Effects of pentachlorophenol and 2,3,4-trichlorophenoxyacetic acid on the microflora of the soil beech wood. *Biol Fertil Soils* 9: 292-300.
- Sugawara N. 1974. Toxic effect of a normal series of phthalate esters on the hatching of shrimp eggs. *Toxicol Appl Pharmacol* 30: 87-89.
- Sun K, Krause GF, Mayer Jr. FL, Eilersieck MR, Basu SP. 1995. Predicting chronic lethality of chemicals to fishes from acute toxicity test data: Theory of accelerated life testing. *Environ Toxicol Chem* 14 (10): 1745-1752.
- Terada H. 1990. Uncouplers of oxidative phosphorylation. *Environ Health Perspect* 87: 213-218.
- Thurston RV, Gilfoil TA, Meyn EL. 1985. Comparative toxicity of ten organic chemicals to ten common aquatic species. *Wat Res* 19 (9): 1145-1155.
- Van Beelen P, Van Vlaardingen PLA, Fleuren-Kemilä AK. 1994. Toxic effects of pollutants on the mineralization of chloroform in river sediments. *Ecotoxicol Environ Saf* 27: 158-167.
- Van Beelen P, Doelman P. 1997. Significance and application of microbial toxicity tests in assessing ecotoxicological risks of environmental contaminants in soil and sediment. *Chemosphere* 34 (3): 455-499.
- Van Gestel CAM, Ma W-C. 1988. Toxicity and bioaccumulation of chlorophenols in earthworms, in relation to bioavailability in soil. *Ecotoxicol Environ Saf* 15: 289-297.
- Veith GD, Mekenyan OG. 1993. A QSAR approach for estimating the aquatic toxicity of soft electrophiles [QSAR for soft electrophiles]. *Quant Struct-Act Relat* 12: 349-356.
- Walton BT, Anderson TA, Hendricks MS, Talmage SS. 1989. Physicochemical properties as predictors of organic chemical effects on soil microbial respiration. *Environ Toxicol Chem* 8: 53-63.
- Walton BT, Anderson TA. 1988. Structural properties of organic chemicals as predictors of biodegradation and microbial toxicity in soils. *Chemosphere* 17 (8): 1501-1507.
- Wängberg S-A, Blanck H. 1988. Multivariate patterns of algal sensitivity to chemicals in relation to phylogeny. *Ecotoxicol Environ Saf* 16: 72-82.
- Wardas W, Wardas M, Majnusz U, Sochacka J. 1995. The effect of benzene, phenol and catechol on the run of the logarithmic phase of growth of *Chlorella vulgaris*, Beijerinck 1890 cultures. *Pol J Environ Stud* 4 (3): 53-59.
- Xiaoyan Z, Likai Z. 1991. Effect of the urease inhibitor, hydroquinone on soil enzyme activities. *Soil Biol Biochem* 23 (11): 1089-1091.