Robust Study Summaries (Aquatic Toxicity – Environment) pertaining to the Screening Assessment on the following substances sponsored by Canada:

- Cobalt [Elemental cobalt], CAS RN 7440-48-4
- Cobalt chloride, CAS RN 7646-79-9
- Sulfuric acid, cobalt (2+) salt (1:1) [Cobalt sulphate], CAS RN 10124-43-3, CAS RN 10393-49-4

Description of the Reliability Evaluation

To evaluate the reliability of studies for key ecological endpoints (i.e., inherent toxicity to aquatic organisms, bioaccumulation potential, persistence), an approach analogous to that of Klimisch et al. (1997) has been developed. It involves the use of a standardized Robust Study Summary form. including a scoring system to quantitatively evaluate the studies. The Robust Study Summary (RSS) is an adaptation of the OECD Robust Study Summary templates (Reference: Organisation for Economic Co-operation and Development. 2009. Manual for the Assessment of Chemicals. Annex 1: Guidance for Completing a SIDS Dossier. Paris (FR): OECD, Environment Directorate). It consists of a checklist of items or criteria (column 2 of the RSS) relating to identity of the substance, experimental protocol or method, test organism, specific test design/conditions, ecological relevance, and results. Most items are weighted according to their criticality to the quality and reliability of the study (column 3). The most important or critical items (which describe parameters/factors that have the most direct influence on the quality of the study) have been given a higher weight (3 points), while the less critical items have been given a lower score (1 or 2 points). For each item, the evaluator must indicate whether the item has been addressed appropriately in the study by answering "yes", "no" or "non-applicable (n/a)" (column 4). Specific information relating to the items is provided in column 5 of the RSS.

Once answers to all the items have been provided in column 4, an overall Robust Study Summary score for the study is calculated as:

Overall Study Score (%) =
$$\frac{\sum W_{\textit{Yes}}}{\sum W_{\textit{Yes}+\textit{No}}} \times 100\%$$

Where:

 W_{Yes} = weight of applicable "Yes" answers;

 W_{Yes+No} = weight of applicable "Yes" and "No" answers.

The overall score's corresponding reliability code and category is determined using the four categories adapted from the Klimisch approach and based on the score ranges as described in Table A.

Table A: Scoring Grid for Overall Study Reliability

Reliability Code	Reliability Category	Overall Study Score Range
1	High confidence	≥ 80%
2	Satisfactory confidence	60 – 79%
3	Low confidence	40 – 59%
4	Not acceptable	< 40%

References

Klimisch HJ, Andreae M, Tillmann U. 1997. A systematic approach for evaluating the quality of experimental toxicological and ecotoxicological data. Regulatory Toxicology and Pharmacology 25:1-5

[OECD] Organisation for Economic Co-operation and Development. 2009. Manual for the Assessment of Chemicals. Annex 1: Guidance for Completing a SIDS Dossier. [Internet]. Paris (FR): OECD, Environment Directorate. [cited July, 2011]. Available from: http://www.oecd.org/dataoecd/13/17/36045066.pdf

Long-term (Chronic)

	Robust Study Summaries Fo	rm: Aq	uatic i	Γ
No	Item	Weight	Yes/No	Specify
1	Reference: Evaluation of <i>Philodina acuticornis</i> (rotifera) a metals. Buikema, Jr., A.L., Cairns Jr., J., and Sullivan, G (4): 648-661			
2	Substance identity: CAS RN	n/a		7646799
3	Substance identity: chemical name(s)	n/a		Cobalt chloride (CoCl2*6H2O)
4	Chemical composition of the substance	2	Υ	
5	Chemical purity	1	N	
6	Persistence/stability of test substance in aquatic solution reported?	1		N/A
	Method			
7	Reference	1	Y	Buikema, Cairns, and Sullivan 1974
8	OECD, EU, national, or other standard method?	3	N	
9	Justification of the method/protocol if not a standard method was used	2	Y	
10	GLP (Good Laboratory Practice)	3		N/A
	Test organism			
11	Organism identity: name	n/a		Philodina acuticornis (Rotifera)
12	Latin or both Latin & common names reported?	1	Υ	
13	Life cycle age / stage of test organism	1	N	
14	Length and/or weight	1		N/A
15	Sex	1	N	
16	Number of organisms per replicate	1	Υ	20-450
17	Organism loading rate	1	N	
18	Food type and feeding periods during the acclimation period	1	Y	
	Test design / condition	ns	T	<u> </u>
19	Test type (acute or chronic	n/a		Chronic (duration > 10% of lifespan (20-22 days))
20	Experiment type (laboratory or field	n/a		Lab
21	Exposure pathways (food, water, both)	n/a		Water
22	Exposure duration	n/a		96 hrs
23	Negative or positive controls (specify)	1	Υ	Negative
24	Number of replicates (including controls)	1	Y	Triplicate
25	Nominal concentrations reported?	1	N	
26	Measured concentrations reported?	3	N	
27	Food type and feeding periods during the long-term tests	1		N/A
28	Were concentrations measured periodically (especially in the chronic test)?	1	N	

			1	1
29	Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature)	3	Y	Temperature: 20 +/- 1,pH: 7.4-7.9, Hardness: 25ppm, Alkalinity: 24ppm
30	Photoperiod and light intensity	1	Υ	12:12D, intensity less than 100 foot-candles.
31	Stock and test solution preparation	1	Y	
32	Was solubilizer/emulsifier used, if the chemical was poorly soluble or unstable?	1		N/A
33	If solubilizer/emulsifier was used, was its concentration reported?	1		N/A
34	If solubilizer/emulsifier was used, was its ecotoxicity reported?	1		N/A
35	Analytical monitoring intervals	1	N	
36	Statistical methods used	1	Υ	probit analysis (Dixon, 1970)
	Information relevant to the da	ta quality	<i>y</i>	
37	Was the endpoint directly caused by the chemical's toxicity, not by organism's health (e.g. when mortality in the control >10%) or physical effects (e.g. 'shading effect')?	n/a	Y	Mortality varied between 1 and 16 percent after 96 horus. The mean mortality was usually less than 10 percent
38	Was the test organism relevant to the Canadian environment?	3	Y	
39	Were the test conditions (pH, temperature, DO, etc.) typical for the test organism?	1	Y	
40	Does system type and design (static, semi-static, flow-through; sealed or open; etc.) correspond to the substance's properties and organism's nature/habits?	2	Υ	
41	Was pH of the test water within the range typical for the Canadian environment (6 to 9)?	1	Y	7.4-7.9
42	Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)?	1	Y	20 +/- 1
43	Was toxicity value below the chemical's water solubility?	3	Υ	
	Results	ı	1	
44	Toxicity values (specify endpoint and value)	n/a	n/a	96 hr EC50: 59 000 ug/L Co
45	Other endpoints reported - e.g. BCF/BAF, LOEC/NOEC (specify)?	n/a	N	
46	Other adverse effects (e.g. carcinogenicity, mutagenicity) reported?	n/a	N	
47	Score: %			67.5
48	EC Reliability code:			2
49	Reliability category (high, satisfactory, low):	S	atisfacto	ory Confidence
50	Tests were performed with soft a hard water, however only results with soft water allowed for the calculation of an EC50.			ever only results allowed for the

Reference: [CDI] The Cobalt Development Institute 2008b. Evaluation of chronic toxicity of cobalt to the aquatic oligochaete, Aeolosoma sp. Testing laboratory: Parametrix Environmental Research Laboratory. Report no.: 4248-1170R. A report to the Cobalt Development Institute. Guildford, Surrey, United Kingdom Report date: 14 Nov 2008. 2 Substance identity: CAS RN n/a Y 7646799 3 Substance identity: chemical name(s) n/a Y CoCl2*6H2O 4 Chemical composition of the substance 2 Y 5 Chemical purity 1 Y 99.90% 6 Persistence/stability of test substance in aquatic 1 N 7 Reference 1 Y Newman 1975; Niederlehner et al. 1984 8 OECD, EU, national, or other standard method? 3 N 9 Justification of the method/protocol if not a standard 2 Y 10 GED, Good Laboratory Practice) Test organism 11 Organism Identity: name n/a Aeolosoma sp. 12 Latin or both Latin & common names reported? 1 Y 13 Life cycle age / stage of test organism 1 Y S 14 Length and/or weight 1 N 15 Sex 1 N 16 Number of organisms per replicate 1 Y S 17 Organism loading rate 1 Y S 18 Food type and feeding periods during the acclimation period 1 Y Infosoria 19 Test type (laboratory of field) n/a Y Lab 20 Experiment type (laboratory of field) n/a Y Lab 21 Exposure pathways (food, water, both) n/a Y V 22 Exposure duration 1 Y Infusoria 23 Negative or positive controls (specify) 1 Y negative 24 Number of replicates (including controls) 1 Y Infusoria 25 Nominal concentrations reported? 1 Y 26 Measured concentrations reported? 1 Y 27 Food type and feeding periods during the long-term tests 1 Y Infusoria 28 Were concentrations reported? (e.g., for the metal toxicity pH, DOC/TOC, water hardness, temperature) 1 Y		Robust Study Summaries Form and Ir	nstruct	ions: A	quatic iT
to the aquatic oligochaete, <i>Aeolosoma</i> sp. Testing laboratory: Parametrix Environmental Research Laboratory: Report no. 2428-1170R. A report to the Cobalt Development Institute. Guildford, Surrey, United Kingdom Report date: 14 Nov 2008. 2 Substance identity: CAS RN	No	Item	Weight	Yes/No	Specify
3 Substance identify: chemical name(s)	1	to the aquatic oligochaete, <i>Aeolosoma</i> sp. Testing labora Research Laboratory. Report no.: 4248-1170R. A report	tory: Para to the Col	ametrix Er	nvironmental
3 Substance identity: chemical name(s)	2	Substance identity: CAS RN	n/a	Υ	7646799
4 Chemical composition of the substance 2 Y 99.90% Chemical purity 1 Y 99.90% Persistence/stability of test substance in aquatic solution reported? **Method** **Reference** **Reference** **Reference** **Reference** **Reference** **Reference** **Invalidation of the method/protocol if not a standard method was used method was used method was used method was used solution robot Latin & common names reported? **Invalidation of the method/protocol if not a standard method was used solution to the method/protocol if not a standard method was used solution to the method/protocol if not a standard method was used solution to the method was used solution to the standard method was used solution to the particular chemical reported? (e.g., for the metal toxicity p.H. DOCTOC, water hardness, temperature) solution to the particular chemical reported? (e.g., for the metal toxicity p.H. DOCTOC, water hardness, temperature) solution solution solution developed and light intensity solution solution was solution solutions solution solution solution solution solution solutions solution solution solution solutions solution solutions solution solutions solution solutions solution solutions soluti	3	•	n/a	Υ	CoCl2*6H2O
Persistence/stability of test substance in aquatic solution reported? Newman 1975; Niederlehner et al. 1984	4		2	Y	
Newman 1975; Niederlehner et al. 1984	5	Chemical purity	1	Υ	99.90%
Reference 1 Y Newman 1975; Niederlehner et al. 1984 B OECD, EU, national, or other standard method? 3 N Justification of the method/protocol if not a standard method was used method was used 3 Y Justification of the method/protocol if not a standard method was used 3 Y Justification of the method/protocol if not a standard 2 Y Justification of the method/protocol if not a standard 2 Y Justification of the method/protocol if not a standard 2 Y Justification of the method/protocol if not a standard 2 Y Justification of the method/protocol if not a standard 2 Y Justification of the method/protocol if not a standard 3 Y Justification of the method was used 4 Normal 2 Justification of the method was used 4 Normal 2 Justification of the method/protocol of the method was used 4 Normal 2 Justification of the Method 2 Justificatio	6		1	N	
7 Reference 1 Y Niederlehner et al. 1984 8 OECD, EU, national, or other standard method? 3 N 9 Justification of the method/protocol if not a standard method was used 2 Y 10 GLP (Good Laboratory Practice) 3 Y Test organism 11 Organism identity: name n/a Aeolosoma sp. 12 Latin or both Latin & common names reported? 1 Y 13 Life cycle age / stage of test organism 1 Y <a <="" href="24" th=""><th></th><th>Method</th><th></th><th></th><th></th>		Method			
9 Justification of the method/protocol if not a standard method was used 3 Y	7	Reference	1	Υ	Niederlehner et al.
method was used 10 GLP (Good Laboratory Practice) Test organism 11 Organism identity: name 12 Latin or both Latin & common names reported? 13 Life cycle age / stage of test organism 14 Length and/or weight 15 Sex 16 Number of organisms per replicate 17 Organism loading rate 18 Food type and feeding periods during the acclimation period 19 Test type (acute or chronic) 19 Experiment type (laboratory or field) 10 Experiment type (laboratory or field) 11 Exposure pathways (food, water, both) 12 Exposure duration 13 Valet 14 Length and/or weight 15 Sex 16 Number of organisms per replicate 17 Valet 18 Food type and feeding periods during the acclimation period Test design / conditions 19 Test type (acute or chronic) 20 Experiment type (laboratory or field) 21 Exposure pathways (food, water, both) 22 Exposure duration 23 Negative or positive controls (specify) 24 Number of replicates (including controls) 25 Nominal concentrations reported? 26 Measured concentrations reported? 27 Food type and feeding periods during the long-term tests 28 Were concentrations measured periodically (especially in the chronic test)? Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature) 30 Photoperiod and light intensity 1 V	8	OECD, EU, national, or other standard method?	3	N	
Test organism identity: name	9		2	Y	
11 Organism identity: name	10	GLP (Good Laboratory Practice)	3	Υ	
12 Latin or both Latin & common names reported? 13 Life cycle age / stage of test organism 14 Length and/or weight 15 Sex 16 Number of organisms per replicate 17 Organism loading rate 18 Food type and feeding periods during the acclimation period 19 Test type (acute or chronic) 20 Experiment type (laboratory or field) 21 Exposure pathways (food, water, both) 22 Exposure duration 23 Negative or positive controls (specify) 24 Number of replicates (including controls) 25 Nominal concentrations reported? 26 Measured concentrations reported? 27 Food type and feeding periods during the long-term tests Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature) 10 Y V Chronic 11 Y Chronic 12 V Water 13 Y V Water 14 V Negative 14 V Negative 15 Nominal concentrations reported? 16 V Nominal concentrations reported? 17 V Infusoria		Test organism	l .	L	
Life cycle age / stage of test organism 1	11	Organism identity: name	n/a		Aeolosoma sp.
Life cycle age / stage of test organism 1	12	Latin or both Latin & common names reported?	1	Υ	·
15 Sex 1 1 N 16 Number of organisms per replicate 1 Y 5 17 Organism loading rate 1 Y 18 Food type and feeding periods during the acclimation period 1 Y Infosoria Test design / conditions 19 Test type (acute or chronic) n/a Y Chronic 20 Experiment type (laboratory or field) n/a Y Lab 21 Exposure pathways (food, water, both) n/a Y Water 22 Exposure duration n/a Y 14 d 23 Negative or positive controls (specify) 1 Y negative 24 Number of replicates (including controls) 1 Y 4 25 Nominal concentrations reported? 1 Y 26 Measured concentrations reported? 3 Y 27 Food type and feeding periods during the long-term tests were concentrations measured periodically (especially in the chronic test)? Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature) 30 Photoperiod and light intensity 1 Y	13	Life cycle age / stage of test organism	1	Υ	
16 Number of organisms per replicate 17 Organism loading rate 18 Food type and feeding periods during the acclimation period 19 Test type (acute or chronic) 19 Experiment type (laboratory or field) 10 Exposure pathways (food, water, both) 11 Y Unfosoria 19 Exposure duration 10 In/a Y Lab 10 Exposure or positive controls (specify) 11 Y negative 12 Exposure duration 13 Y Under	14	Length and/or weight	1	N	
17 Organism loading rate 18 Food type and feeding periods during the acclimation period Test design / conditions 19 Test type (acute or chronic) 10 Experiment type (laboratory or field) 11 Exposure pathways (food, water, both) 12 Exposure duration 13 Negative or positive controls (specify) 14 Y negative 15 Nominal concentrations reported? 16 Measured concentrations reported? 17 Food type and feeding periods during the long-term tests 18 Were concentrations measured periodically (especially in the chronic test)? 19 Test type (acute or chronic) 10 N/a Y Chronic 11 Y Water 12 Exposure pathways (food, water, both) 11 Y negative 12 Number of replicates (including controls) 12 Y negative 13 Y Infusoria 14 Y Infusoria 15 Y Infusoria 16 Were concentrations measured periodically (especially in the chronic test)? 19 Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature) 19 V Infusoria	15	Sex	1	N	
Food type and feeding periods during the acclimation period Test design / conditions 19 Test type (acute or chronic)	16	- · · · · · · · · · · · · · · · · · · ·	1		5
Test design / conditions 19 Test type (acute or chronic)	17	Organism loading rate	1	Υ	
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21 Exposure pathways (food, water, both) 22 Exposure duration 23 Negative or positive controls (specify) 24 Number of replicates (including controls) 25 Nominal concentrations reported? 26 Measured concentrations reported? 27 Food type and feeding periods during the long-term tests 28 Were concentrations measured periodically (especially in the chronic test)? Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature) 1 Y Water Y d A V Infusoria Y Infusoria Y P Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature) 30 Photoperiod and light intensity 1 Y	19	Test type (acute or chronic)	n/a	Υ	Chronic
22 Exposure duration	20	Experiment type (laboratory or field)	n/a	Υ	Lab
Negative or positive controls (specify) Number of replicates (including controls) Nominal concentrations reported? Measured concentrations reported? Rests Food type and feeding periods during the long-term tests Were concentrations measured periodically (especially in the chronic test)? Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature) Negative ne	21	Exposure pathways (food, water, both)	n/a	Υ	Water
24 Number of replicates (including controls) 1 Y 4 25 Nominal concentrations reported? 1 Y 26 Measured concentrations reported? 3 Y 27 Food type and feeding periods during the long-term tests 1 Y Infusoria 28 Were concentrations measured periodically (especially in the chronic test)? 1 Y Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature) 3 Y 30 Photoperiod and light intensity 1 Y	22		n/a	Υ	14 d
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Food type and feeding periods during the long-term tests Were concentrations measured periodically (especially in the chronic test)? Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature) Photoperiod and light intensity 1	25	Nominal concentrations reported?	1	Y	
tests Were concentrations measured periodically (especially in the chronic test)? Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature) Photoperiod and light intensity 1 Y	26	Measured concentrations reported?	3	Y	
in the chronic test)? Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature) 30 Photoperiod and light intensity 1 Y	27		1	Y	Infusoria
29 particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature) 30 Photoperiod and light intensity 1 Y	28		1	Y	
3	29	particular chemical reported? (e.g., for the metal toxicity	3	Υ	
31 Stock and test solution preparation 1 Y	30	Photoperiod and light intensity	1	Y	
	31	Stock and test solution preparation	1	Y	

32	Was solubilizer/emulsifier used, if the chemical was poorly soluble or unstable?	1	NA	
33	If solubilizer/emulsifier was used, was its concentration reported?	1	NA	
34	If solubilizer/emulsifier was used, was its ecotoxicity reported?	1	NA	
35	Monitoring intervals (including observations and water quality parameters) reported?	1	Υ	
36	Statistical methods used	1	Υ	TRAP/piecewise linear gression
	Information relevant to the da	ta quality	/	
37	Was the endpoint directly caused by the chemical's toxicity, not by organism's health (e.g. when mortality in the control >10%) or physical effects (e.g. 'shading effect')?	n/a		
38	Was the test organism relevant to the Canadian environment?	3	Υ	
39	Were the test conditions (pH, temperature, DO, etc.) typical for the test organism?	1	Υ	
40	Does system type and design (static, semi-static, flow-through; sealed or open; etc.) correspond to the substance's properties and organism's nature/habits?	2	Y	static-renewall
41	Was pH of the test water within the range typical for the Canadian environment (6 to 9)?	1	Υ	7.4-7.8
42	Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)?	1	Υ	24-25
43	Was toxicity value below the chemical's water solubility?	3	Υ	
	Results			
44	Toxicity values (specify endpoint and value)	n/a	n/a	EC10 14d (reproduction) = 155 ug/L
45	Other endpoints reported - e.g. BCF/BAF, LOEC/NOEC (specify)?	n/a		
46	Other adverse effects (e.g. carcinogenicity, mutagenicity) reported?	n/a		
47	Score: %	87.0		
48	EC Reliability code:	1		
49	Reliability category (high, satisfactory, low):	High Confidence		
50	Comments			

	Robust Study Summaries Form and I	nstruct	ions: A	Aquatic iT		
No	Item	Weight	Yes/No	Specify		
1	Reference: [CDI] The Cobalt Development Institute 2009b. Early life-stage toxicity of cobalt to zebrafish (<i>Danio rerio</i>) under flow-through conditions. Testing laboratory: Parametrix Environmental Research Laboratory. Report no.: 4248-396. A report to the Cobalt Development Institute. Guildford, Surrey, United Kingdom. Report date: 26 Jan 2009.					
2	Substance identity: CAS RN	n/a	Υ	7646799		
3	Substance identity: chemical name(s)	n/a	Υ	CoCl2*6H2O		
4	Chemical composition of the substance	2	Υ			
5	Chemical purity	1	Υ	99.90%		
6	Persistence/stability of test substance in aquatic solution reported?	1	N			
	Method	T	T	T		
7	Reference	1	Y	ASTM 2002, OECD 1992		
8	OECD, EU, national, or other standard method?	3	N	ASTM E1241, OECD 210		
9	Justification of the method/protocol if not a standard method was used	2	N/A			
10	GLP (Good Laboratory Practice)	3	Υ			
	Test organism					
11	Organism identity: name	n/a		Brachyodanio rerio		
12	Latin or both Latin & common names reported?	1	Υ			
13	Life cycle age / stage of test organism	1	Y	Start as freshly- fertilized eggs		
14	Length and/or weight	1	Υ	growth assessed		
15	Sex	1	N			
16	Number of organisms per replicate	1	Υ	25		
17	Organism loading rate	1	Υ			
18	Food type and feeding periods during the acclimation period	1	Υ	Infusoria		
	Test design / condition	ns				
19	Test type (acute or chronic)	n/a	Υ	Chronic		
20	Experiment type (laboratory or field)	n/a	Υ	Lab		
21	Exposure pathways (food, water, both)	n/a	Υ	Water		
22	Exposure duration	n/a	Υ	33 d		
23	Negative or positive controls (specify)	1	Υ	Negative		
24	Number of replicates (including controls)	1	Υ	4		
25	Nominal concentrations reported?	1	Υ			
26	Measured concentrations reported?	3	Υ			
27	Food type and feeding periods during the long-term tests	1	Y	Infusoria		
28	Were concentrations measured periodically (especially in the chronic test)?	1	Υ			
29	Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature)	3	Y			
30	Photoperiod and light intensity	1	Y			
31	Stock and test solution preparation	1	Υ			

32	Was solubilizer/emulsifier used, if the chemical was poorly soluble or unstable?	1	N/A	
33	If solubilizer/emulsifier was used, was its concentration reported?	1	NA	
34	If solubilizer/emulsifier was used, was its ecotoxicity reported?	1	NA	
35	Monitoring intervals (including observations and water quality parameters) reported?	1	Υ	
36	Statistical methods used	1	Υ	TRAP/piecewise linear regression
	Information relevant to the da	ta quality	/	
37	Was the endpoint directly caused by the chemical's toxicity, not by organism's health (e.g. when mortality in the control >10%) or physical effects (e.g. 'shading effect')?	n/a		
38	Was the test organism relevant to the Canadian environment?	3	Υ	
39	Were the test conditions (pH, temperature, DO, etc.) typical for the test organism?	1	Υ	
40	Does system type and design (static, semi-static, flow-through; sealed or open; etc.) correspond to the substance's properties and organism's nature/habits?	2	Υ	flow-through
41	Was pH of the test water within the range typical for the Canadian environment (6 to 9)?	1	Υ	7.8 ± 0.1
42	Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)?	1	N	27-29
43	Was toxicity value below the chemical's water solubility?	3	Υ	
	Results			
44	Toxicity values (specify endpoint and value)	n/a	n/a	EC10 33d (biomass) = 1084 ug/L
45	Other endpoints reported - e.g. BCF/BAF, LOEC/NOEC (specify)?	n/a		
46	Other adverse effects (e.g. carcinogenicity, mutagenicity) reported?	n/a		
47	7 Score: % 86.4			86.4
48	EC Reliability code:			1
49	Reliability category (high, satisfactory, low):		High (Confidence
50	Comments			

Robust Study Summaries Form and Instructions: Aquatic iT				
No	Item	Weight	Yes/No	Specify
1	Reference: [CDI] The Cobalt Development Institute 2005 to Ceriodaphnia dubia. Testing laboratory: Parametrix En Report no.: 4248-43. A report to the Cobalt Developmen Kingdom.	vironmen	tal Resea	arch Laboratory.
2	Substance identity: CAS RN	n/a	Υ	7646799
3	Substance identity: chemical name(s)	n/a	Υ	CoCl2*6H2O
4	Chemical composition of the substance	2	Υ	
5	Chemical purity	1	N	
6	Persistence/stability of test substance in aquatic solution reported?	1	N	
	Method	<u>I</u>		
7	Reference	1	Υ	USEPA 2002
8	OECD, EU, national, or other standard method?	3	Υ	USEPA
9	Justification of the method/protocol if not a standard method was used	2	N/A	
10	GLP (Good Laboratory Practice)	3	Υ	
	Test organism	l		
11	Organism identity: name	n/a	Υ	Ceriodaphnia dubia
12	Latin or both Latin & common names reported?	1	Υ	
13	Life cycle age / stage of test organism	1	Υ	< 24h old at start
14	Length and/or weight	1	N	
15	Sex	1	N	
16	Number of organisms per replicate	1	Υ	1
17	Organism loading rate	1	Y	
18	Food type and feeding periods during the acclimation period	1	Y	algae and YCT
	Test design / condition	าร		
19	Test type (acute or chronic)	n/a	Υ	Chronic
20	Experiment type (laboratory or field)	n/a	Υ	Lab
21	Exposure pathways (food, water, both)	n/a	Υ	Water
22	Exposure duration	n/a	Υ	21 d
23	Negative or positive controls (specify)	1	Υ	negative
24	Number of replicates (including controls)	1	Υ	10
25	Nominal concentrations reported?	1	Υ	
26	Measured concentrations reported?	3	Υ	
27	Food type and feeding periods during the long-term tests	1	Υ	algae and YCT
28	Were concentrations measured periodically (especially in the chronic test)?	1	Y	
29	Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature)	3	Y	
30	Photoperiod and light intensity	1	Υ	
31	Stock and test solution preparation	1	Υ	
32	Was solubilizer/emulsifier used, if the chemical was poorly soluble or unstable?	1	NA	
33	If solubilizer/emulsifier was used, was its concentration reported?	1	NA	

34	If solubilizer/emulsifier was used, was its ecotoxicity reported?	1	NA	
35	Monitoring intervals (including observations and water quality parameters) reported?	1	Υ	
36	Statistical methods used	1	Υ	threshold sigmoid regression
	Information relevant to the da	ta quality	/	
37	Was the endpoint directly caused by the chemical's toxicity, not by organism's health (e.g. when mortality in the control >10%) or physical effects (e.g. 'shading effect')?	n/a		
38	Was the test organism relevant to the Canadian environment?	3	Υ	
39	Were the test conditions (pH, temperature, DO, etc.) typical for the test organism?	1	Υ	
40	Does system type and design (static, semi-static, flow-through; sealed or open; etc.) correspond to the substance's properties and organism's nature/habits?	2	Y	static-renewall
41	Was pH of the test water within the range typical for the Canadian environment (6 to 9)?	1	Υ	8.0-8.7
42	Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)?	1	Υ	25 ± 1
43	Was toxicity value below the chemical's water solubility?	3	Y	
	Results			
44	Toxicity values (specify endpoint and value)	n/a	n/a	EC10 21d (reproduction) = 7.9 ug/L
45	Other endpoints reported - e.g. BCF/BAF, LOEC/NOEC (specify)?	n/a		
46	Other adverse effects (e.g. carcinogenicity, mutagenicity) reported?	n/a		
47	Score: % 90.9			90.9
48	EC Reliability code: 1			1
49	Reliability category (high, satisfactory, low):		High (Confidence
50	Comments			

Reference: Pacific Ecorisk 2005. An Evaluation of the Acute Toxicity of Cobalt in Panther Creek Water to Three Resident Invertebrate Species (Brachycentrus americanus, Centrophilum conturbatum, and Servatella tibialis) and the Acute and Chronic Toxicity of Cobalt in Panther Creek Water to Chironomus tentans and Oncorhynchus mykiss. Testing laboratory: Pacific Ecorisk, Martinez, CA. A report to the Blackbird Mine Site Group. Report date: 3 Feb 2005. 2 Substance identity: CAS RN		Robust Study Summaries Form: Aquatic iT					
Water to Three Resident Invertebrate Species (<i>Brachycentrus americanus</i> , <i>Centrophilum conturbatum, and Serratella tibialis</i>) and the Acute and Chronic Toxicity of Cobalt in Panther Creek Water to <i>Chironomus tentans</i> and <i>Oncorhynchus mykiss</i> . Testing laboratory: Pacific Ecorisk, Martinez, CA. A report to the Blackbird Mine Sife Group. Report date: 3 Feb 2005. 2 Substance identity: CAS RN	No	Item	Weight	Yes/No	Specify		
Substance identity: chemical name(s)	1	Water to Three Resident Invertebrate Species (<i>Brachycentrus americanus, Centroptilum conturbatum, and Serratella tibialis</i>) and the Acute and Chronic Toxicity of Cobalt in Panther Creek Water to <i>Chironomus tentans</i> and <i>Oncorhynchus mykiss</i> . Testing laboratory: Pacific					
Substance identity: chemical name(s)	2	Substance identity: CAS RN	n/a	Υ	10124433		
Chemical composition of the substance		,,,	-				
Section Chemical purity		•					
Persistence/stability of test substance in aquatic solution reported? Nethod		,		N	The decision on panny		
Reference	6		1	Y	Appendix O		
B OECD, EU, national, or other standard method? 3		Method					
Sustification of the method/protocol if not a standard method was used Superior of the method/protocol if not a standard method was used Superior of the method Superior of the was used Superior of the method Superior of the was used Superior of the method Superior of the	7	Reference	1	Υ	USEPA 2000		
method was used 2 NA NA SUPPLIANCE STATE S	8	OECD, EU, national, or other standard method?	3	Υ	USEPA		
Test organism 11 Organism identity: name 12 Latin or both Latin & common names reported? 13 Life cycle age / stage of test organism 14 Length and/or weight 15 Sex 16 Number of organisms per replicate 17 Organism loading rate 18 Food type and feeding periods during the acclimation period 19 Test type (acute or chronic) 20 Experiment type (laboratory or field) 21 Exposure pathways (food, water, both) 22 Exposure duration 23 Negative or positive controls (specify) 24 Number of replicates (including controls) 25 Measured concentrations reported? 26 Measured concentrations reported? 27 Food type and feeding periods during the long-term tests 28 Were concentrations measured periodically (especially in the chronic test)? 30 Photoperiod and light intensity 1 Y Just photo, not intensity	9	• • • • • • • • • • • • • • • • • • •	2	NA			
11 Organism identity: name 12 Latin or both Latin & common names reported? 13 Life cycle age / stage of test organism 14 Length and/or weight 15 Sex 16 Number of organisms per replicate 17 Organism loading rate 18 Food type and feeding periods during the acclimation period 19 Test type (acute or chronic) 20 Experiment type (laboratory or field) 21 Exposure pathways (food, water, both) 22 Exposure duration 23 Negative or positive controls (specify) 24 Number of replicates (including controls) 25 Nominal concentrations reported? 26 Measured concentrations reported? 27 Food type and feeding periods during the long-term tests 28 Were concentrations measured periodically (especially in the chronic test)? 30 Photoperiod and light intensity 31 Py Sutt Photo, not intensity 31 Py Sutt Photo, not intensity	10	GLP (Good Laboratory Practice)	3	N			
11 Organism identity: name			•		1		
13 Life cycle age / stage of test organism 1 Y Larvea 14 Length and/or weight 1 Y growth assessed 15 Sex 1 NA 16 Number of organisms per replicate 1 Y 12 17 Organism loading rate 1 Y Fish flakes 18 Food type and feeding periods during the acclimation period 1 Y Fish flakes Test type (acute or chronic) 20 Experiment type (laboratory or field) n/a Y Chronic 20 Experiment type (laboratory or field) n/a Y Lab 21 Exposure pathways (food, water, both) n/a Y Water 22 Exposure duration n/a Y Water 22 Exposure duration n/a Y Both 23 Negative or positive controls (specify) 1 Y Both 24 Number of replicates (including controls) 1 Y 13 25 Nominal concentrations reported? 1 Y Fish flakes	11	Organism identity: name	n/a	Y			
14 Length and/or weight 15 Sex 1 NA 16 Number of organisms per replicate 17 Organism loading rate 18 Food type and feeding periods during the acclimation period 19 Test type (acute or chronic) 20 Experiment type (laboratory or field) 21 Exposure pathways (food, water, both) 22 Exposure duration 23 Negative or positive controls (specify) 24 Number of replicates (including controls) 25 Nominal concentrations reported? 26 Measured concentrations reported? 27 Food type and feeding periods during the long-term type (laboratory or field) 28 Were concentrations measured periodically (especially in the chronic test)? 29 Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature) 1 Y Just photo, not intensity	12	Latin or both Latin & common names reported?	1	Υ			
15 Sex 1 NA 1 16 Number of organisms per replicate 1 Y 12 17 Organism loading rate 1 Y 12 18 Food type and feeding periods during the acclimation period 1 Y Fish flakes **Test design / conditions** 19 Test type (acute or chronic) n/a Y Chronic 20 Experiment type (laboratory or field) n/a Y Lab 21 Exposure pathways (food, water, both) n/a Y Water 22 Exposure duration n/a Y 20 d 23 Negative or positive controls (specify) 1 Y Both 24 Number of replicates (including controls) 1 Y 13 25 Nominal concentrations reported? 1 Y 26 Measured concentrations reported? 3 Y 27 Food type and feeding periods during the long-term tests 28 Were concentrations measured periodically (especially in the chronic test)? Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature) 10 NA 11 Y 12 12 12 Y Just photo, not intensity	13	Life cycle age / stage of test organism	1	Υ	Larvea		
16 Number of organisms per replicate 17 Organism loading rate 18 Food type and feeding periods during the acclimation period 19 Test type (acute or chronic) 19 Experiment type (laboratory or field) 20 Experiment type (laboratory or field) 21 Exposure pathways (food, water, both) 22 Exposure duration 23 Negative or positive controls (specify) 24 Number of replicates (including controls) 25 Nominal concentrations reported? 26 Measured concentrations reported? 27 Food type and feeding periods during the long-term tests 28 Were concentrations measured periodically (especially in the chronic test)? 30 Photoperiod and light intensity 31 Y Just photo, not intensity	14	Length and/or weight	1	Υ	growth assessed		
17 Organism loading rate 18 Food type and feeding periods during the acclimation period 19 Test type (acute or chronic) 10 Experiment type (laboratory or field) 11 Y Chronic 12 Exposure pathways (food, water, both) 13 Negative or positive controls (specify) 14 Y Both 15 Nominal concentrations reported? 16 Measured concentrations reported? 17 Food type and feeding periods during the long-term tests 18 Were concentrations measured periodically (especially in the chronic test)? 19 Test type (acute or chronic) 10 N/a Y Chronic 11 Y Lab 12 Lab 13 Y Both 14 Y Both 15 Y Both 16 Y Both 17 Y Fish flakes 18 Were concentrations reported? 19 Food type and feeding periods during the long-term tests 10 Y Fish flakes 11 Y Fish flakes 12 Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature) 19 Organism loading televant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature) 10 A Just photo, not intensity	15	Sex	1	NA			
Food type and feeding periods during the acclimation period Test design / conditions 1 Y Fish flakes Test type (acute or chronic)	16	Number of organisms per replicate	1	Υ	12		
Test design / conditions 19 Test type (acute or chronic) 20 Experiment type (laboratory or field) 21 Exposure pathways (food, water, both) 22 Exposure duration 23 Negative or positive controls (specify) 24 Number of replicates (including controls) 25 Nominal concentrations reported? 26 Measured concentrations reported? 27 Food type and feeding periods during the long-term tests 28 Were concentrations measured periodically (especially in the chronic test)? 30 Photoperiod and light intensity Test design / conditions N/a Y Chronic 1 Y Water 20 d 1 Y Both Y 13 Y Fish flakes 1 Y Fish flakes	17	Organism loading rate	1	Υ			
Test type (acute or chronic) Part type (laboratory or field) Experiment type (laboratory or field) Exposure pathways (food, water, both) Exposure pathways (food, water, both) Exposure duration Na Y Water Exposure duration Na Y 20 d Negative or positive controls (specify) Number of replicates (including controls) Nominal concentrations reported? Negative doncentrations reported? Measured concentrations reported? Food type and feeding periods during the long-term tests Were concentrations measured periodically (especially in the chronic test)? Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature) Photoperiod and light intensity Tests Y Just photo, not intensity	18		1	Υ	Fish flakes		
Experiment type (laboratory or field) 21 Exposure pathways (food, water, both) 22 Exposure duration 23 Negative or positive controls (specify) 24 Number of replicates (including controls) 25 Nominal concentrations reported? 26 Measured concentrations reported? 27 Food type and feeding periods during the long-term tests 28 Were concentrations measured periodically (especially in the chronic test)? Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature) N/A V Water 29 V Both Y 13 Y Fish flakes 1 Y Fish flakes		Test design / condition	15				
21 Exposure pathways (food, water, both) 22 Exposure duration 23 Negative or positive controls (specify) 24 Number of replicates (including controls) 25 Nominal concentrations reported? 26 Measured concentrations reported? 27 Food type and feeding periods during the long-term tests 28 Were concentrations measured periodically (especially in the chronic test)? Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature) Nater Water Y Both Y Fish flakes Y Fish flakes	19	Test type (acute or chronic)	n/a	Υ	Chronic		
22 Exposure duration	20	Experiment type (laboratory or field)	n/a	Υ	Lab		
23 Negative or positive controls (specify) 24 Number of replicates (including controls) 25 Nominal concentrations reported? 26 Measured concentrations reported? 27 Food type and feeding periods during the long-term tests 28 Were concentrations measured periodically (especially in the chronic test)? Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature) 1 Y Both Y 13 Y Fish flakes 1 Y Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature) 1 Y Just photo, not intensity	21	Exposure pathways (food, water, both)	n/a	Υ	Water		
24 Number of replicates (including controls) 1 Y 13 25 Nominal concentrations reported? 1 Y 26 Measured concentrations reported? 3 Y 27 Food type and feeding periods during the long-term tests 1 Y Fish flakes 28 Were concentrations measured periodically (especially in the chronic test)? 1 Y Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature) 3 Y 30 Photoperiod and light intensity 1 Y Just photo, not intensity	22	Exposure duration	n/a	Υ	20 d		
25 Nominal concentrations reported? 26 Measured concentrations reported? 27 Food type and feeding periods during the long-term tests 28 Were concentrations measured periodically (especially in the chronic test)? Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature) 30 Photoperiod and light intensity 1 Y Just photo, not intensity	23	Negative or positive controls (specify)	1	Υ	Both		
26 Measured concentrations reported? 3 Y 27 Food type and feeding periods during the long-term tests 1 Y Fish flakes 28 Were concentrations measured periodically (especially in the chronic test)? 1 Y Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature) 3 Y 30 Photoperiod and light intensity 1 Y Just photo, not intensity	24	Number of replicates (including controls)	1	Υ	13		
Food type and feeding periods during the long-term tests Were concentrations measured periodically (especially in the chronic test)? Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature) Photoperiod and light intensity 1 Y Fish flakes 1 Y Just photo, not intensity	25		1	Υ			
tests Were concentrations measured periodically (especially in the chronic test)? Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature) Photoperiod and light intensity 1 Y FISH TIAKES 1 Y Just photo, not intensity	26		3	Υ			
in the chronic test)? Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature) Y Just photo, not intensity	27	71 01	1	Y	Fish flakes		
29 particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature) 30 Photoperiod and light intensity 1 Y Just photo, not intensity	28		1	Υ			
30 Photoperiod and light intensity intensity intensity	29	particular chemical reported? (e.g., for the metal toxicity	3	Y			
	30	Photoperiod and light intensity	1	Y			
<u> </u>	31	Stock and test solution preparation	1	N			

32	Was solubilizer/emulsifier used, if the chemical was poorly soluble or unstable?	1	NA		
33	If solubilizer/emulsifier was used, was its concentration reported?	1	NA		
34	If solubilizer/emulsifier was used, was its ecotoxicity reported?	1	NA		
35	Monitoring intervals (including observations and water quality parameters) reported?	1	Υ		
36	Statistical methods used	1	Υ	type of fit/software for EC10 determination?	
	Information relevant to the date	ta quality	,		
37	Was the endpoint directly caused by the chemical's toxicity, not by organism's health (e.g. when mortality in the control >10%) or physical effects (e.g. 'shading effect')?	n/a			
38	Was the test organism relevant to the Canadian environment?	3	Υ		
39	Were the test conditions (pH, temperature, DO, etc.) typical for the test organism?	1	Υ		
40	Does system type and design (static, semi-static, flow-through; sealed or open; etc.) correspond to the substance's properties and organism's nature/habits?	2	Y	flow-through	
41	Was pH of the test water within the range typical for the Canadian environment (6 to 9)?	1	Υ	7.58-8.17	
42	Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)?	1	Υ	23 ± 1	
43	Was toxicity value below the chemical's water solubility?	3	Υ		
	Results				
44	Toxicity values (specify endpoint and value)	n/a	n/a	EC10 20d (growth)=123 ug/L	
45	Other endpoints reported - e.g. BCF/BAF, LOEC/NOEC (specify)?	n/a			
46	Other adverse effects (e.g. carcinogenicity, mutagenicity) reported?	n/a			
47	7 Score: % 88.4				
48	EC Reliability code:	1			
49	Reliability category (high, satisfactory, low):	High Confidence			
50	50 Comments				

	Robust Study Summaries Form and Ir	struct	ions: A	Aquatic iT
No	ltem	Weight	Yes/No	Specify
1	Reference: [CDI] The Cobalt Development Institute 2009 P, De Schamphelaere K, Deleebeeck N, Janssen C. 200 freshwater organisms. Testing laboratory: EURAS & Lab Ghent University. A report to the Cobalt Development Instingdom.	7. Effect oratory of	of cobalt Environn	(CoCl2.6H2O) on nental Toxicology,
2	Substance identity: CAS RN	n/a		7646799
3	Substance identity: chemical name(s)	n/a		CoCl2*6H2O
4	Chemical composition of the substance	2	Υ	
5	Chemical purity	1	N	
6	Persistence/stability of test substance in aquatic solution reported?	1	N	
	Method			
7	Reference	1	Υ	OECD 1984
8	OECD, EU, national, or other standard method?	3	Υ	OECD 211
0	Justification of the method/protocol if not a standard method was used	2	N/A	
10	GLP (Good Laboratory Practice)	3	N	
	Test organism			
11	Organism identity: name	n/a	Y	Daphnia magna
12	Latin or both Latin & common names reported?	1	Υ	
13	Life cycle age / stage of test organism	1	Υ	<24 h at start
14	Length and/or weight	1	N	
15	Sex	1	N	
16	Number of organisms per replicate	1	Υ	1
17	Organism loading rate	1	Υ	
18	Food type and feeding periods during the acclimation period	1	Y	zooplankton
	Test design / condition	าร		
19	Test type (acute or chronic)	n/a	Υ	Chronic
20	Experiment type (laboratory or field)	n/a	Υ	Lab
21	Exposure pathways (food, water, both)	n/a	Υ	Water
22	Exposure duration	n/a	Υ	21 d
23	Negative or positive controls (specify)	1	Υ	negative
24	Number of replicates (including controls)	1	Y	10
25	Nominal concentrations reported?	1	Y	
26	Measured concentrations reported?	3	Y	
27	Food type and feeding periods during the long-term tests	1	Y	zooplankton
28	Were concentrations measured periodically (especially in the chronic test)?	1	Y	
29	Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature)	3	Y	
30	Photoperiod and light intensity	1	Υ	
31	Stock and test solution preparation	1	Υ	
32	Was solubilizer/emulsifier used, if the chemical was poorly soluble or unstable?	1	NA	
33	If solubilizer/emulsifier was used, was its concentration reported?	1	NA	

34	If solubilizer/emulsifier was used, was its ecotoxicity reported?	1	NA	
35	Monitoring intervals (including observations and water quality parameters) reported?	1	Υ	
36	Statistical methods used	1	Υ	Statistica/Mann- Whitney U-test
	Information relevant to the da	ta quality	/	
37	Was the endpoint directly caused by the chemical's toxicity, not by organism's health (e.g. when mortality in the control >10%) or physical effects (e.g. 'shading effect')?	n/a		
38	Was the test organism relevant to the Canadian environment?	3	Υ	
39	Were the test conditions (pH, temperature, DO, etc.) typical for the test organism?	1	Υ	
40	Does system type and design (static, semi-static, flow-through; sealed or open; etc.) correspond to the substance's properties and organism's nature/habits?	2	Υ	semi-static
41	Was pH of the test water within the range typical for the Canadian environment (6 to 9)?	1	Υ	7.22-7.64
42	Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)?	1	Υ	20 ± 1
43	Was toxicity value below the chemical's water solubility?	3	Y	
	Results			
44	Toxicity values (specify endpoint and value)	n/a	n/a	EC10 21d (reproduction) = 54 ug/L
45	Other endpoints reported - e.g. BCF/BAF, LOEC/NOEC (specify)?	n/a		
46	Other adverse effects (e.g. carcinogenicity, mutagenicity) reported?	n/a		
47	Score: %	Score: % 84.1		
48	EC Reliability code: 1			1
49	Reliability category (high, satisfactory, low):	ory (high, satisfactory, low): High Confidence		
50	Comments			

	Robust Study Summaries Form and Ir	nstruct	ions: A	Aquatic iT
No	Item	Weight	Yes/No	Specify
1	Reference: [CDI] The Cobalt Development Institute 2009 P, De Schamphelaere K, Deleebeeck N, Janssen C. 200 freshwater organisms. Testing laboratory: EURAS & Laboratory Cobalt Development Institute 2009 A report to the Cobalt Development Institute 2009 P. Development Institute	(CoCl2.6H2O) on nental Toxicology,		
2	Substance identity: CAS RN	n/a	Υ	7646799
3	Substance identity: chemical name(s)	n/a	Υ	CoCl2*6H2O
4	Chemical composition of the substance	2	Υ	
5	Chemical purity	1	N	
6	Persistence/stability of test substance in aquatic solution reported?	1	N	
	Method	ı		
7	Reference	1	N/A	No international method is available for this test
8	OECD, EU, national, or other standard method?	3	N	
9	Justification of the method/protocol if not a standard method was used	2	Υ	method fully described, validity criteria used from OECD 202
10	GLP (Good Laboratory Practice)	3	N	
	Test organism	1		
11	Organism identity: name	n/a	Y	Hyalella azteca
12	Latin or both Latin & common names reported?	1	Υ	-
13	Life cycle age / stage of test organism	1	Υ	6-7 d at start
14	Length and/or weight	1	Υ	growth assessed
15	Sex	1	N/A	
16	Number of organisms per replicate	1	Υ	3
17	Organism loading rate	1	Υ	3 Org/100 ml
18	Food type and feeding periods during the acclimation period	1	Y	YTC/algal suspension
	Test design / condition	ทร		
19	Test type (acute or chronic)	n/a	Υ	Chronic
20	Experiment type (laboratory or field)	n/a	Υ	Lab
21	Exposure pathways (food, water, both)	n/a	Υ	Water
22	Exposure duration	n/a	Υ	28 d
23	Negative or positive controls (specify)	1	Υ	negative
24	Number of replicates (including controls)	1	Υ	10
25	Nominal concentrations reported?	1	Y	
26	Measured concentrations reported?	3	Y	\
27	Food type and feeding periods during the long-term tests	1	Υ	YTC/algal suspension
28	Were concentrations measured periodically (especially in the chronic test)?	1	Y	
29	Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature)	3	Y	
30	Photoperiod and light intensity	1	Y	12:12 L:D ~1000 Lux

31	Stock and test solution preparation	1	Υ	
32	Was solubilizer/emulsifier used, if the chemical was poorly soluble or unstable?	1	NA	
33	If solubilizer/emulsifier was used, was its concentration reported?	1	NA	
34	If solubilizer/emulsifier was used, was its ecotoxicity reported?	1	NA	
35	Monitoring intervals (including observations and water quality parameters) reported?	1	Υ	Days 0,3,7,2,1,26
36	Statistical methods used	1	Y	TRAP/log-logistic or piecewise linear regression (Reanalyses of reported data by Stubblefield)
	Information relevant to the da	ta quality	/	
37	Was the endpoint directly caused by the chemical's toxicity, not by organism's health (e.g. when mortality in the control >10%) or physical effects (e.g. 'shading effect')?	n/a		
38	Was the test organism relevant to the Canadian environment?	3	Υ	
39	Were the test conditions (pH, temperature, DO, etc.) typical for the test organism?	1	Υ	
40	Does system type and design (static, semi-static, flow-through; sealed or open; etc.) correspond to the substance's properties and organism's nature/habits?	2	Υ	2x wk, static- renewall
41	Was pH of the test water within the range typical for the Canadian environment (6 to 9)?	1	Υ	7.15-7.69
42	Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)?	1	Υ	25 ± 1
43	Was toxicity value below the chemical's water solubility?	3	Υ	
	Results			
44	Toxicity values (specify endpoint and value)	n/a	n/a	EC10 28d (dry weight)=5.5 ug/L
45	Other endpoints reported - e.g. BCF/BAF, LOEC/NOEC (specify)?	n/a		
46	Other adverse effects (e.g. carcinogenicity, mutagenicity) reported?	n/a		
47	Score: %			81.8
48	EC Reliability code:			1
49	Reliability category (high, satisfactory, low):		High (Confidence
50	Comments			

	Robust Study Summaries Form and Ir	nstruct	ions: A	quatic iT
No	Item	Weight	Yes/No	Specify
1	Reference: [CDI] The Cobalt Development Institute 2009 P, De Schamphelaere K, Deleebeeck N, Janssen C. 200 freshwater organisms. Testing laboratory: EURAS & Laboratory Cobalt Development Institute 2009 P, De Schamphelaere K, Deleebeeck N, Janssen C. 200 freshwater organisms. Testing laboratory: EURAS & Laboratory Cobalt Development Institute 2009 P, De Schamphelaere K, Deleebeeck N, Janssen C. 200 freshwater organisms.	7. Effect oratory of	of cobalt (Environm	(CoCl2.6H2O) on nental Toxicology,
2	Substance identity: CAS RN	n/a	Υ	7646799
3	Substance identity: chemical name(s)	n/a	Υ	CoCl2*6H2O
4	Chemical composition of the substance	2	Υ	
5	Chemical purity	1	N	
6	Persistence/stability of test substance in aquatic solution reported?	1	Ν	
	Method	L		I
7	Reference	1	Y	OECD 2002
8	OECD, EU, national, or other standard method?	3	Υ	OECD 221
9	Justification of the method/protocol if not a standard method was used	2	N/A	
10	GLP (Good Laboratory Practice)	3	N	
	Test organism			<u> </u>
11	Organism identity: name	n/a		Lemna minor
12	Latin or both Latin & common names reported?	1	Υ	
13	Life cycle age / stage of test organism	1	Υ	2 to 5 fronds
14	Length and/or weight	1	N	
15	Sex	1	N/A	
16	Number of organisms per replicate	1	Y	12 fronds
17	Organism loading rate	1	Υ	
18	Food type and feeding periods during the acclimation period	1	Y	modified SSI- culturing medium
	Test design / condition	าร		
19	Test type (acute or chronic)	n/a	Υ	Chronic
20	Experiment type (laboratory or field)	n/a	Υ	Lab
21	Exposure pathways (food, water, both)	n/a	Υ	Water
22	Exposure duration	n/a	Υ	7 d
23	Negative or positive controls (specify)	1	Υ	negative
24	Number of replicates (including controls)	1	Υ	4
25	Nominal concentrations reported?	1	Υ	
26	Measured concentrations reported?	3	Υ	
27	Food type and feeding periods during the long-term tests	1	Υ	
28	Were concentrations measured periodically (especially in the chronic test)?	1	Y	
29	Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature)	3	Y	
30	Photoperiod and light intensity	1	Υ	
31	Stock and test solution preparation	1	Υ	
32	Was solubilizer/emulsifier used, if the chemical was poorly soluble or unstable?	1	NA	
33	If solubilizer/emulsifier was used, was its concentration reported?	1	NA	

34	If solubilizer/emulsifier was used, was its ecotoxicity reported?	1	NA		
35	Monitoring intervals (including observations and water quality parameters) reported?	1	Υ		
36	Statistical methods used	1	Υ	Statsoft/non-linear estimations	
	Information relevant to the da	ta quality	/		
37	Was the endpoint directly caused by the chemical's toxicity, not by organism's health (e.g. when mortality in the control >10%) or physical effects (e.g. 'shading effect')?	n/a			
38	Was the test organism relevant to the Canadian environment?	3	Υ		
39	Were the test conditions (pH, temperature, DO, etc.) typical for the test organism?	1	Υ		
40	Does system type and design (static, semi-static, flow-through; sealed or open; etc.) correspond to the substance's properties and organism's nature/habits?	2	Y	static	
41	Was pH of the test water within the range typical for the Canadian environment (6 to 9)?	1	Υ	6.52-6.68	
42	Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)?	1	Υ	24 ± 2	
43	Was toxicity value below the chemical's water solubility?	3	Υ		
	Results			-	
44	Toxicity values (specify endpoint and value)	n/a	n/a	EC10 7d (growth) = 4.9 ug/L	
45	Other endpoints reported - e.g. BCF/BAF, LOEC/NOEC (specify)?	n/a			
46	Other adverse effects (e.g. carcinogenicity, mutagenicity) reported?	n/a			
47	Score: % 86.0				
48	48 EC Reliability code: 1				
49	Reliability category (high, satisfactory, low):		High (Confidence	
50	Comments				

	Robust Study Summaries Form and Ir	nstruct	ions: A	quatic iT	
No	Item	Weight	Yes/No	Specify	
Reference: [CDI] The Cobalt Development Institute 2009d. Early life-stage toxicity of cobalt to rainbow trout (<i>Oncorhynchus mykiss</i>) under flow-through conditions. Testing laboratory: Parametrix Environmental Research Laboratory. Report no.: 4248-73. A report to the Cobalt Development Institute. Guildford, Surrey, United Kingdom. Report date: 29 Jan 2009.					
2	Substance identity: CAS RN	n/a		7646799	
3	Substance identity: chemical name(s)	n/a		CoCl2*6H2O	
4	Chemical composition of the substance	2	Y		
5	Chemical purity	1	Υ	99.90%	
6	Persistence/stability of test substance in aquatic solution reported?	1	N		
	Method				
7	Reference	1	Y	ASTM 2002, OECD 1992	
8	OECD, EU, national, or other standard method?	3	Y	ASTM E1241, OECD 210	
9	Justification of the method/protocol if not a standard method was used	2	N/A		
10	GLP (Good Laboratory Practice)	3	Υ		
	Test organism				
11	Organism identity: name	n/a	Υ	Oncorhynchus mykiss	
12	Latin or both Latin & common names reported?	1	Υ		
13	Life cycle age / stage of test organism	1	Υ	Start as freshly- fertilized eggs	
14	Length and/or weight	1	Υ	growth assessed	
15	Sex	1	N		
16	Number of organisms per replicate	1	Υ	50 start, thinned to 20	
17	Organism loading rate	1	Υ		
18	Food type and feeding periods during the acclimation period	1	Y	trout chow	
	Test design / condition	าร			
19	Test type (acute or chronic)	n/a	Υ	Chronic	
20	Experiment type (laboratory or field)	n/a	Υ	Lab	
21	Exposure pathways (food, water, both)	n/a	Υ	Water	
22	Exposure duration	n/a	Υ	81 d	
23	Negative or positive controls (specify)	1	Υ	negative	
24	Number of replicates (including controls)	1	Υ	4	
25	Nominal concentrations reported?	1	Y		
26	Measured concentrations reported?	3	Y		
27	Food type and feeding periods during the long-term tests	1	Y	trout chow	
28	Were concentrations measured periodically (especially in the chronic test)?	1	Y		
29	Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature)	3	Y		
30	Photoperiod and light intensity	1	Υ		

31	Stock and test solution preparation	1	Υ	
32	Was solubilizer/emulsifier used, if the chemical was poorly soluble or unstable?	1	NA	
33	If solubilizer/emulsifier was used, was its concentration reported?	1	NA	
34	If solubilizer/emulsifier was used, was its ecotoxicity reported?	1	NA	
35	Monitoring intervals (including observations and water quality parameters) reported?	1	Y	
36	Statistical methods used	1	Υ	TRAP/log-logistic or piecewise linear regression
	Information relevant to the da	ta quality	/	
37	Was the endpoint directly caused by the chemical's toxicity, not by organism's health (e.g. when mortality in the control >10%) or physical effects (e.g. 'shading effect')?	n/a		
38	Was the test organism relevant to the Canadian environment?	3	Υ	
39	Were the test conditions (pH, temperature, DO, etc.) typical for the test organism?	1	Υ	
40	Does system type and design (static, semi-static, flow-through; sealed or open; etc.) correspond to the substance's properties and organism's nature/habits?	2	Υ	flow-through
41	Was pH of the test water within the range typical for the Canadian environment (6 to 9)?	1	Υ	7.6-7.8
42	Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)?	1	Y	10-14
43	Was toxicity value below the chemical's water solubility?	3	Υ	
	Results	T	1	
44	Toxicity values (specify endpoint and value)	n/a	n/a	EC10 81d (biomass)=2171 ug/l
45	Other endpoints reported - e.g. BCF/BAF, LOEC/NOEC (specify)?	n/a		
46	Other adverse effects (e.g. carcinogenicity, mutagenicity) reported?	n/a		
47	7 Score: % 95.5			
48	EC Reliability code:			1
49	Reliability category (high, satisfactory, low):		High (Confidence
50	Comments			

	Robust Study Summaries Form and Ir	nstruct	ions: A	Aquatic iT	
No	Item	Weight	Yes/No	Specify	
Reference: [CDI] The Cobalt Development Institute 2009e. Heijerick D, Ghekiere A, De Schamphelaere K, Deleebeeck N, Janssen C. 2007. Effect of cobalt (CoCl2 freshwater organisms. Testing laboratory: EURAS & Laboratory of Environmental Ghent University. A report to the Cobalt Development Institute. Guildford, Surrey, Kingdom					
2	Substance identity: CAS RN	n/a	Υ	7646799	
3	Substance identity: chemical name(s)	n/a	Υ	CoCl2*6H2O	
4	Chemical composition of the substance	2	Υ		
5	Chemical purity	1	N		
6	Persistence/stability of test substance in aquatic solution reported?	1	N		
	Method				
7	Reference	1	Υ	OECD 1984	
8	OECD, EU, national, or other standard method?	3	N	OECD 201	
9	Justification of the method/protocol if not a standard method was used	2	N		
10	GLP (Good Laboratory Practice)	3	N		
	Test organism	•		<u> </u>	
11	Organism identity: name	n/a	Y	Pseudokirchneriella subcapitata	
12	Latin or both Latin & common names reported?	1	Υ		
13	Life cycle age / stage of test organism	1	N/A		
14	Length and/or weight	1	N/A		
15	Sex	1	N/A		
16	Number of organisms per replicate	1	Υ		
17	Organism loading rate	1	Υ	1x10 ⁴ cells/ml	
18	Food type and feeding periods during the acclimation period	1	Υ	OECD 201 media with replacement of EDTA with DOC	
	Test design / condition	ns			
19	Test type (acute or chronic)	n/a	Υ	Chronic	
20	Experiment type (laboratory or field)	n/a	Y	Lab	
21	Exposure pathways (food, water, both)	n/a	Υ	Water	
22	Exposure duration	n/a	Υ	4 d	
23	Negative or positive controls (specify)	1	Υ	negative	
24	Number of replicates (including controls)	1	Υ	3	
25	Nominal concentrations reported?	1	Υ		
26	Measured concentrations reported?	3	Y		
27	Food type and feeding periods during the long-term tests	1	Y		
28	Were concentrations measured periodically (especially in the chronic test)?	1	Y		
29	Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature)	3	Y		
30	Photoperiod and light intensity	1	Υ		
31	Stock and test solution preparation	1	Υ		
32	Was solubilizer/emulsifier used, if the chemical was poorly soluble or unstable?	1	NA		

			,	
33	If solubilizer/emulsifier was used, was its concentration reported?	1	NA	
34	If solubilizer/emulsifier was used, was its ecotoxicity reported?	1	NA	
35	Monitoring intervals (including observations and water quality parameters) reported?	1	Υ	
36	Statistical methods used	1	Υ	Statsoft/non-linear estimations
	Information relevant to the da	ta quality	/	
37	Was the endpoint directly caused by the chemical's toxicity, not by organism's health (e.g. when mortality in the control >10%) or physical effects (e.g. 'shading effect')?	n/a		
38	Was the test organism relevant to the Canadian environment?	3	Y	
39	Were the test conditions (pH, temperature, DO, etc.) typical for the test organism?	1	Υ	
40	Does system type and design (static, semi-static, flow-through; sealed or open; etc.) correspond to the substance's properties and organism's nature/habits?	2	Y	static
41	Was pH of the test water within the range typical for the Canadian environment (6 to 9)?	1	Υ	7.51-7.72
42	Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)?	1	Y	25 ± 1
43	Was toxicity value below the chemical's water solubility?	3	Υ	
	Results			
44	Toxicity values (specify endpoint and value)	n/a	n/a	EC10 4d (growth) = 23 ug/L
45	Other endpoints reported - e.g. BCF/BAF, LOEC/NOEC (specify)?	n/a		
46	Other adverse effects (e.g. carcinogenicity, mutagenicity) reported?	n/a		
47	Score: % 76.7			76.7
48	EC Reliability code:	2		
49	Reliability category (high, satisfactory, low):	Satisfactory Confidence		
50	Comments			

	Robust Study Summaries Form and I	nstruct	tions:	Aquatic iT			
No	Item	Weight	Yes/No	Specify			
Reference: [CDI] The Cobalt Development Institute 2009c. Early life-stage toxicity of cobalt to the fathead minnow (<i>Pimephales promelas</i>) under flow-through conditions. Testing laboratory: Parametrix Environmental Research Laboratory. Report no.: 4248-71. A report to the Cobalt Development Institute. Guildford, Surrey, United Kingdom. Report date: 29 Jan 2009.							
2	Substance identity: CAS RN	n/a	Υ	7646799			
3	Substance identity: chemical name(s)	n/a	Υ	CoCl2*6H2O			
4	Chemical composition of the substance	2	Υ				
5	Chemical purity	1	Υ	99.90%			
6	Persistence/stability of test substance in aquatic solution reported?	1	Z				
	Method	ı		T			
7	Reference	1	Y	ASTM 2002, OECD 1992			
8	OECD, EU, national, or other standard method?	3	Y	ASTM E1241, OECD 210			
9	Justification of the method/protocol if not a standard method was used	2	N/A				
10	GLP (Good Laboratory Practice)	3	Υ				
	Test organism						
11	Organism identity: name	n/a		Pimephales promelas			
12	Latin or both Latin & common names reported?	1	Υ				
13	Life cycle age / stage of test organism	1	Υ	Start as freshly- fertilized eggs			
14	Length and/or weight	1	Υ	growth assessed			
15	Sex	1	N				
16	Number of organisms per replicate	1	Υ	25			
17	Organism loading rate	1	Υ				
18	Food type and feeding periods during the acclimation period	1	Y	Brine shrimp			
	Test design / condition	ns					
19	Test type (acute or chronic)	n/a	Υ	Chronic			
20	Experiment type (laboratory or field)	n/a	Υ	Lab			
21	Exposure pathways (food, water, both)	n/a	Υ	Water			
22	Exposure duration	n/a	Υ	34 d			
23	Negative or positive controls (specify)	1	Υ	Negative			
24	Number of replicates (including controls)	1	Υ	4			
25	Nominal concentrations reported?	1	Υ				
26	Measured concentrations reported?	3	Υ				
27	Food type and feeding periods during the long-term tests	1	Υ	Brine shrimp			
28	Were concentrations measured periodically (especially in the chronic test)?	1	Y				
29	Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature)	3	Y				
		1		t			
30	Photoperiod and light intensity	1	Υ				

32	Was solubilizer/emulsifier used, if the chemical was poorly soluble or unstable?	1	NA		
33	If solubilizer/emulsifier was used, was its concentration reported?	1	NA		
34	If solubilizer/emulsifier was used, was its ecotoxicity reported?	1	NA		
35	Monitoring intervals (including observations and water quality parameters) reported?	1	Υ		
36	Statistical methods used	1	Υ	TRAP/log-logistic or piecewise linear regression	
	Information relevant to the da	ata qualit	ty .		
37	Was the endpoint directly caused by the chemical's toxicity, not by organism's health (e.g. when mortality in the control >10%) or physical effects (e.g. 'shading effect')?	n/a			
38	Was the test organism relevant to the Canadian environment?	3	Υ		
39	Were the test conditions (pH, temperature, DO, etc.) typical for the test organism?	1	Υ		
40	Does system type and design (static, semi-static, flow-through; sealed or open; etc.) correspond to the substance's properties and organism's nature/habits?	2	Y	flow-throw	
41	Was pH of the test water within the range typical for the Canadian environment (6 to 9)?	1	Υ	7.6-8.5	
42	Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)?	1	Υ	24-27	
43	Was toxicity value below the chemical's water solubility?	3	Υ		
	Results				
44	Toxicity values (specify endpoint and value)	n/a	n/a	EC10 34d (survival)=351 ug/L	
45	Other endpoints reported - e.g. BCF/BAF, LOEC/NOEC (specify)?	n/a			
46	Other adverse effects (e.g. carcinogenicity, mutagenicity) reported?	n/a			
47	Score: % 95.5				
48	EC Reliability code:	1			
49	Reliability category (high, satisfactory, low): High Confidence				
50	Comments				

	Robust Study Summaries Form: Aquatic iT				
No	Item	Weight	Yes/No	Specify	
1	Reference: Toxicity of mercury, copper, nickel, lead, and zebrafish, <i>Brachydanio rerio</i> . Dave, G., and Xiu, R. 1991 Contamination and Toxicology. 21: 126-134				
2	Substance identity: CAS RN	n/a		7646799	
3	Substance identity: chemical name(s)	n/a		Cobalt Chloride (CoCl2*6H20)	
4	Chemical composition of the substance	2	Υ		
5	Chemical purity	1	Y	Baker analytical grade	
6	Persistence/stability of test substance in aquatic solution reported?	1		N/A	
	Method				
7	Reference	1	Y	SIS 1988, Dave et al., 1987	
8	OECD, EU, national, or other standard method?	3	N		
9	Justification of the method/protocol if not a standard method was used	2	Υ		
10	GLP (Good Laboratory Practice)	3		N/A	
	Test organism				
11	Organism identity: name	n/a		Zebrafish (Brachydanio rerio)	
12	Latin or both Latin & common names reported?	1	Υ		
13	Life cycle age / stage of test organism	1	Υ	Embryos and larvae	
14	Length and/or weight	1		N/A	
15	Sex	1		N/A	
16	Number of organisms per replicate	1	Υ	30 eggs, reduced to 10	
17	Organism loading rate	1	Ν		
18	Food type and feeding periods during the acclimation period	1		N/A	
	Test design / condition	ns			
19	Test type (acute or chronic	n/a		Chronic	
20	Experiment type (laboratory or field	n/a		Lab	
21	Exposure pathways (food, water, both)	n/a		Water	
22	Exposure duration	n/a		16 days	
23	Negative or positive controls (specify)	1	Υ	Negative	
24	Number of replicates (including controls)	1	Y	1 for exposure, 2 for controls	
25	Nominal concentrations reported?	1	Y	11 (1.6, 3.1, 6.3, 12.5, 25, 50, 100, 200, 400, 800, 1600)	
26	Measured concentrations reported?	3	N		
27	Food type and feeding periods during the long-term tests	1	Υ	No feeding	
28	Were concentrations measured periodically (especially in the chronic test)?	1	N		

If solubilizer/emulsifier was used, was its concentration reported? If solubilizer/emulsifier was used, was its ecotoxicity If your was a control of the con	29 30 31 32	Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature) Photoperiod and light intensity Stock and test solution preparation Was solubilizer/emulsifier used, if the chemical was poorly soluble or unstable?	3 1 1	Y Y N	Temperature: 25.4-26.4 C, pH: 7.5-7.7, Harndess: 100, Dissolved oxygen ranged from 88-100% saturation. 12h light and 12h dark N/A	
Teported? 1		reported?	-			
Statistical methods used 1		reported?			IN/A	
Was the endpoint directly caused by the chemical's toxicity, not by organism's health (e.g. when mortality in the control >10%) or physical effects (e.g. 'shading effect')?				•		
Was the endpoint directly caused by the chemical's toxicity, not by organism's health (e.g. when mortality in the control >10%) or physical effects (e.g. 'shading effect')? Was the test organism relevant to the Canadian environment? Were the test conditions (pH, temperature, DO, etc.) typical for the test organism? Does system type and design (static, semi-static, flow-through; sealed or open; etc.) correspond to the substance's properties and organism's nature/habits? Was pH of the test water within the range typical for the Canadian environment (6 to 9)? Was temperature of the test water within the range typical for the Canadian environment (6 to 27°C)? Was toxicity value below the chemical's water a young to the Canadian environment (6 to 27°C)? Was toxicity value below the chemical's water a young to the Canadian environment (6 to 27°C)? Total Toxicity values (specify endpoint and value) Nother endpoints reported - e.g. BCF/BAF, LOEC/NOEC (specify)? Was toxicity values (specify endpoint and value) Other endpoints reported - e.g. BCF/BAF, LOEC/NOEC (specify)? Nother endpoints reported - e.g. a carcinogenicity, mutagenicity) reported? Cother adverse effects (e.g. carcinogenicity, mutagenicity) reported? Cother endpoints reported? Cother endpoints reported? Cother endpoints reported? Cother endpoints reported?	36					
were the test conditions (pH, temperature, DO, etc.) typical for the test organism? Does system type and design (static, semi-static, flow-through; sealed or open; etc.) correspond to the substance's properties and organism's nature/habits? Was pH of the test water within the range typical for the Canadian environment (6 to 9)? Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)? Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)? Was toxicity value below the chemical's water solubility? Results Toxicity values (specify endpoint and value) Name of the endpoints reported - e.g. BCF/BAF, LOEC/NOEC (specify)? Name of the test water within the range typical for the Canadian environment (5 to 27°C)? In ug Co/L: Hatching time, MATC: 10840, Survival time, MATC: 340 (MATC reported as geometric mean of NOEC and LOEC) Other adverse effects (e.g. carcinogenicity, mutagenicity) reported? Name of the test conditions (pH, temperature, DO, etc.) In ug Co/L: Hatching time, MATC: 10840, Survival time, MATC: 340 (MATC reported as geometric mean of NOEC and LOEC) Other adverse effects (e.g. carcinogenicity, mutagenicity) reported? Results Results A Name of NOEC and LOEC)	37	Was the endpoint directly caused by the chemical's toxicity, not by organism's health (e.g. when mortality in the control >10%) or physical effects (e.g. 'shading			embryo mortality	
typical for the test organism? 1	38	Was the test organism relevant to the Canadian environment?	3	Ν		
through; sealed or open; etc.) correspond to the substance's properties and organism's nature/habits? 41 Was pH of the test water within the range typical for the Canadian environment (6 to 9)? 42 Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)? 43 Was toxicity value below the chemical's water solubility? **Results** 44 Toxicity values (specify endpoint and value) Above the canadian environment (5 to 27°C)? Above the canadian environment (5 to 27°C)? **Results** 45 Other endpoints reported - e.g. BCF/BAF, LOEC/NOEC (specify)? Above the canadian environment (5 to 27°C)? Above the ca	39		1	Y		
Canadian environment (6 to 9)? Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)? Was toxicity value below the chemical's water solubility? Results Toxicity values (specify endpoint and value) National Properties of the test water within the range typical for the Canadian environment (5 to 27°C)? Results Toxicity values (specify endpoint and value) National Properties of the test water within the range typical for the Canadian environment (5 to 27°C)? Results In ug Co/L: Hatching time, MATC: 10840, Survival time, MATC: 340 (MATC reported as geometric mean of NOEC and LOEC) Other endpoints reported - e.g. BCF/BAF, LOEC/NOEC (specify)? Other adverse effects (e.g. carcinogenicity, mutagenicity) reported? Other adverse effects (e.g. carcinogenicity, mutagenicity) reported? Toxicity values (specify endpoint and value) National Properties of NoEC and LOEC) National Properties of NoEC and LOEC) Matching time, MATC: 10840, Survival time, MATC: 340 (MATC reported as geometric mean of NOEC and LOEC) And December of NoEC and LOEC) Results And December of NoEC and LOEC) And December of NoEC and LOEC)	40	through; sealed or open; etc.) correspond to the	2	Y		
typical for the Canadian environment (5 to 27°C)? Was toxicity value below the chemical's water solubility? Results Toxicity values (specify endpoint and value) Nother endpoints reported - e.g. BCF/BAF, LOEC/NOEC (specify)? Nother endpoints reported	41		1	Y	7.5-7.7	
Solubility? Sesults	42	typical for the Canadian environment (5 to 27°C)?	1	Y	25.4-26.4	
44 Toxicity values (specify endpoint and value) Nother endpoints reported - e.g. BCF/BAF, LOEC/NOEC (specify)? Nother endpoi	43	solubility?	3	Y		
Other endpoints reported - e.g. BCF/BAF, LOEC/NOEC (specify)? Other adverse effects (e.g. carcinogenicity, mutagenicity) reported? Other adverse effects (e.g. carcinogenicity, m/a N			1			
Other endpoints reported - e.g. BCF/BAF, LOEC/NOEC (specify)? N Hatching time, MATC: 10840, Survival time, MATC: 340 (MATC reported as geometric mean of NOEC and LOEC) Other adverse effects (e.g. carcinogenicity, mutagenicity) reported? N N Hatching time, MATC: 340 (MATC reported as geometric mean of NOEC and LOEC) N Other adverse effects (e.g. carcinogenicity, mutagenicity) reported? N Other adverse effects (e.g. carcinogenicity, mutagenicity) reported? Other adverse effects (e.g. carcinogenicity, mutagenicity) reported? 2 69.2	44	Toxicity values (specify endpoint and value)	n/a	n/a		
mutagenicity) reported? 47 Score: % 48 EC Reliability code: 2	45		n/a	N	Hatching time, MATC: 10840, Survival time, MATC: 340 (MATC reported as geometric mean of	
48 EC Reliability code: 2	46		n/a	N		
	47	7 Score: % 69.2				
49 Reliability category (high, satisfactory, low): Satisfactory Confidence	48	EC Reliability code:			2	
	49	49 Reliability category (high, satisfactory, low): Satisfactory Confidence				

50	Comments	Concentrations were not listed in the text, however the authors reported 11 concentrations, with a dilution factor of 0.5. Combing this information with what can be seen in Figure 5, we can estimate the concentrations used. The authors suggest that cobalt could have chronic effects at concentrations far below those which are acutely toxic to fish.
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	Robust Study Summaries Form: Aquatic iT						
No	Item	Weight	Yes/No	Specify			
1	Reference: De Schamphelaere, K.A.C., Koene, J.M., Heijerick, D.G., and Janssen, C.R.2008. Reduction of growth and haemolymph Ca levels in the freshwater snail <i>Lymnaea stagnalis</i> chronically exposed to cobalt Ecotoxicology and Environmental Safety. 71: 65-70.						
2	Substance identity: CAS RN	n/a		7646799			
3	Substance identity: chemical name(s)	n/a		Cobalt chloride			
4	Chemical composition of the substance	2	Υ				
5	Chemical purity	1	N				
6	Persistence/stability of test substance in aquatic solution reported?	1		N/A			
	Method						
7	Reference	1	N				
8	OECD, EU, national, or other standard method?	3	N				
9	Justification of the method/protocol if not a standard method was used	2	Υ				
10	GLP (Good Laboratory Practice)	3	N				
	Test organism						
11	Organism identity: name	n/a		Lymnaea stagnalis			
12	Latin or both Latin & common names reported?	1	Υ				
13	Life cycle age / stage of test organis	1	Υ	31 days old			
14	Length and/or weight	1	Υ	Mean wet weight: 22.8 +/- 6.2 mg			
15	Sex	1		N/A			
16	Number of organisms per replicate	1	Υ	1			
17	Organism loading rate	1	Y	Indirectly. Mean weight weight was 22.8 mg. Organisms were placed in 200ml of experimental medium, therefore the loading rate was 114 mg/L			
18	Food type and feeding periods during the acclimation period	1	N				
	Test design / condition	ons					
19	Test type (acute or chronic	n/a		Chronic			
20	Experiment type (laboratory or field	n/a		Lab			
21	Exposure pathways (food, water, both)	n/a		Water			
22	Exposure duration	n/a		28d			
23	Negative or positive controls (specify)	1	Υ	Negative			
24	Number of replicates (including controls)	1	Υ	8			
25	Nominal concentrations reported?	1	Y	6 (3.2, 10, 32, 100, 320, 1000 ug/L)			
26	Measured concentrations reported?	3	Y	2.6, 8.2, 26, 79, 270, 860 ug/L			

27	Food type and feeding periods during the long-term tests	1	Y	Fed 55mg lettuce twice a week, during the first 2 weeks, then 65 mg of lettuce twice a week for the remaining 2 weeks.	
28	Were concentrations measured periodically (especially in the chronic test)?	1	Y	Twice a week and at test termination,	
29	Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature)	3	Y	Temerature: 20 C, pH: 7.6-7.9, Hardness: 140 mg/L	
30	Photoperiod and light intensity	1	Υ	12L:12D	
31	Stock and test solution preparation	1	Υ	With deionized water.	
32	Was solubilizer/emulsifier used, if the chemical was poorly soluble or unstable?	1		N/A	
33	If solubilizer/emulsifier was used, was its concentration reported?	1		N/A	
34	If solubilizer/emulsifier was used, was its ecotoxicity reported?	1		N/A	
35	Analytical monitoring intervals	1	Υ		
36	Statistical methods used	1	Υ		
	Information relevant to the da	ta quality	/		
37	Was the endpoint directly caused by the chemical's toxicity, not by organism's health (e.g. when mortality in the control >10%) or physical effects (e.g. 'shading effect')?	n/a	Y	No mortality was observed.	
38	Was the test organism relevant to the Canadian environment?	3	Υ		
39	Were the test conditions (pH, temperature, DO, etc.) typical for the test organism?	1	Υ		
40	Does system type and design (static, semi-static, flow-through; sealed or open; etc.) correspond to the substance's properties and organism's nature/habits?	2	Y		
41	Was pH of the test water within the range typical for the Canadian environment (6 to 9)?	1	Υ	7.6-7.9	
42	Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)?	1	Υ	20	
43	Was toxicity value below the chemical's water solubility?	3	Υ		
	Results	ı			
44	Toxicity values (specify endpoint and value)	n/a	n/a		
45	Other endpoints reported - e.g. BCF/BAF, LOEC/NOEC (specify)?	n/a	N	In ug Co/L. 28d growth MATC: 45.3; (NOEC: 26, LOEC 79); EC10: 22	
46	Other adverse effects (e.g. carcinogenicity, mutagenicity) reported?	n/a	N		
47	Score: % 79.5				
48	B EC Reliability code: 2				

49	Reliability category (high, satisfactory, low):	Satisfactory Confidence
50	Comments	Authors reported the NOEC and LOEC. The study also examined the Ca concentration in the haemolymph of the snails and found that at 79 ug Co/L, the concentration of Ca was significantly lower than in the control.

No		Robust Study Summaries Form: Aquatic iT					
INO	Item	Weight	Yes/No	Specify			
1	Reference: Relationship between heavy metal accumulation and toxicity in <i>Spirodela polyrhiza</i> (L.) Schleid. and <i>Azolla pinnata</i> R.Br. Gaur, J.P., Noraho, N., Chauhan, Y.S. 1994. Aquatic Botany.49: 183-192.						
2	Substance identity: CAS RN	n/a		7646799			
3	Substance identity: chemical name(s)	n/a		Cobalt chloride			
4	Chemical composition of the substance	2	Y				
5	Chemical purity	1	Υ	Analytical-grade			
6	Persistence/stability of test substance in aquatic solution reported?	1		N/A			
	Method						
7	Reference	1	Υ	Wang, 1990			
8	OECD, EU, national, or other standard method?	3	N				
9	Justification of the method/protocol if not a standard method was used	2	Y				
10	GLP (Good Laboratory Practice)	3		N/A			
	Test organism						
11	Organism identity: name	n/a		Spirodela polyrhiza (L.) Schleid.			
12	Latin or both Latin & common names reported?	1	Υ				
13	Life cycle age / stage of test organism	1		N/A			
14	Length and/or weight	1	N				
15	Sex	1		N/A			
16	Number of organisms per replicate	1	Υ	10			
17	Organism loading rate	1	N				
18	Food type and feeding periods during the acclimation period	1		N/A			
	Test design / condition	15					
19	Test type (acute or chronic)	n/a		Chronic (duration > 10% lifespan (12 days))			
20	Experiment type (laboratory or field)	n/a		Lab			
21	Exposure pathways (food, water, both)	n/a		Water			
22	Exposure duration	n/a		4 days			
23	Negative or positive controls (specify)	1	Υ	Negative			
24	Number of replicates (including controls)	1	Υ	5			
25	Nominal concentrations reported?	1	Υ	0.85, 1.7, 8.5, 17.0, 85.0 uM			
26	Measured concentrations reported?	3	N				
27	Food type and feeding periods during the long-term tests	1		N/A			
28	Were concentrations measured periodically (especially in the chronic test)?	1	N				
29	Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature)	3	N	Only temperature: 25 +/- 1, and pH: 7.0 were reported.			
30	Photoperiod and light intensity	1	Y	14L:10D, 45 umol/m^2/s			
31	Stock and test solution preparation	1	Υ				

32	Was solubilizer/emulsifier used, if the chemical was poorly soluble or unstable?	1		N/A	
33	If solubilizer/emulsifier was used, was its concentration reported?	1		N/A	
34	If solubilizer/emulsifier was used, was its ecotoxicity reported?	1		N/A	
35	Analytical monitoring intervals	1	N		
36	Statistical methods used	1	Y		
	Information relevant to the da	ta quality	/		
37	Was the endpoint directly caused by the chemical's toxicity, not by organism's health (e.g. when mortality in the control >10%) or physical effects (e.g. 'shading effect')?	n/a	Υ		
38	Was the test organism relevant to the Canadian environment?	3	Υ		
39	Were the test conditions (pH, temperature, DO, etc.) typical for the test organism?	1	Υ		
40	Does system type and design (static, semi-static, flow-through; sealed or open; etc.) correspond to the substance's properties and organism's nature/habits?	2	Υ		
41	Was pH of the test water within the range typical for the Canadian environment (6 to 9)?	1	Υ	7.0	
42	Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)?	1	Υ	25+/- 1	
43	Was toxicity value below the chemical's water solubility?	3	Υ		
	Results				
44	Toxicity values (specify endpoint and value)	n/a	n/a	4 day EC50(growth rate): 2.3 +/- 0.1 (SD) uM Co = 140 ug/L.	
45	Other endpoints reported - e.g. BCF/BAF, LOEC/NOEC (specify)?	n/a			
46	Other adverse effects (e.g. carcinogenicity, mutagenicity) reported?	n/a			
47	Score: %	% 65.8			
48	EC Reliability code: 2				
49	Reliability category (high, satisfactory, low):	Satisfactory Confidence			
50	Comments	The order of toxicity (of metals tested) was Cd> Cu=Ni>Co>Cr>Zn >Pb for this species.			

	Robust Study Summaries Form: Aquatic iT					
No	Item	Weight	Yes/No	Specify		
1	Reference: The effects of lesser known metals and one of promelas) and Daphnia magna. Kimball, G.L. 1978. Departments.					
2	Substance identity: CAS RN	n/a		10393494		
3	Substance identity: chemical name(s)	n/a		Cobalt sulphate		
4	Chemical composition of the substance	2	Υ			
5	Chemical purity	1	Υ	Reagent grade		
6	Persistence/stability of test substance in aquatic solution reported?	1		N/A		
	Method					
7	Reference	1	N			
8	OECD, EU, national, or other standard method?	3	N			
9	Justification of the method/protocol if not a standard method was used	2	Υ			
10	GLP (Good Laboratory Practice)	3		N/A		
	Test organism					
11	Organism identity: name	n/a		Pimphales promelas		
12	Latin or both Latin & common names reported?	1	Υ			
13	Life cycle age / stage of test organism	1	Υ	16-40 hours old eggs		
14	Length and/or weight	1		N/A		
15	Sex	1		N/A		
16	Number of organisms per replicate	1	Υ	20 eggs/ 10 fry		
17	Organism loading rate	1	N			
18	Food type and feeding periods during the acclimation period	1	N			
	Test design / condition	ns				
19	Test type (acute or chronic	n/a		Chronic		
20	Experiment type (laboratory or field	n/a		Lab		
21	Exposure pathways (food, water, both)	n/a		Water		
22	Exposure duration	n/a		28 days		
23	Negative or positive controls (specify)	1	Υ	Negative		
24	Number of replicates (including controls)	1	Υ	4		
25	Nominal concentrations reported?	1	Υ	7 (0, 0.4, 0.1, 0.21, 0.39, 0.81, 1.61 mg/L)		
26	Measured concentrations reported?	3	N			
27	Food type and feeding periods during the long-term tests	1	Y			
28	Were concentrations measured periodically (especially in the chronic test)?	1	Y			
29	Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature)	3	Y	Temperature: 24.4 C, pH: 8.14, Dissolved oxygen: 6.88mg/L, Alkalinity: 236 mg/L		

30	Photoperiod and light intensity	1	N	
31	Stock and test solution preparation	1	Υ	
32	Was solubilizer/emulsifier used, if the chemical was poorly soluble or unstable?	1		N/A
33	If solubilizer/emulsifier was used, was its concentration reported?	1		N/A
34	If solubilizer/emulsifier was used, was its ecotoxicity reported?	1		N/A
35	Analytical monitoring intervals	1	Υ	
36	Statistical methods used	1	Υ	
	Information relevant to the da	ta quality	<u>′</u>	
37	Was the endpoint directly caused by the chemical's toxicity, not by organism's health (e.g. when mortality in the control >10%) or physical effects (e.g. 'shading effect')?	n/a	Y	
38	Was the test organism relevant to the Canadian environment?	3	Υ	
39	Were the test conditions (pH, temperature, DO, etc.) typical for the test organism?	1	Υ	
40	Does system type and design (static, semi-static, flow-through; sealed or open; etc.) correspond to the substance's properties and organism's nature/habits?	2	Υ	
41	Was pH of the test water within the range typical for the Canadian environment (6 to 9)?	1	Υ	Mean 8.14
42	Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)?	1	Υ	Mean 24.4
43	Was toxicity value below the chemical's water solubility?	3	Υ	
	Results			
44	Toxicity values (specify endpoint and value)	n/a	n/a	IC10 (Growth, weight): 480 ug/L; LOEC (growth, length): 390ug/L, LOEC (growth, weight): 810 ug/L, LOEC (mortality): 1610ug/L. MATC (growth, length): 290 ug/L. MATC (growth, weight): 560 ug/L. MATC (mortality): 1140 ug/L. NOEC (growth, length): 210ug/L. NOEC (growth, weight): 390 ug/L. N
45	Other endpoints reported - e.g. BCF/BAF, LOEC/NOEC (specify)?	n/a		
46	Other adverse effects (e.g. carcinogenicity, mutagenicity) reported?	n/a	N	
47	Score: %	Score: % 75.0		
48	EC Reliability code: 2			2
49	Reliability category (high, satisfactory, low):	S	atisfacto	ry Confidence

50	Comments	Hatchability in all treatments were generally equivalent to the controls. There was a slight, yet significant decrase from controls at 1.61 mg Co/L. The author noted that growth was a more sensitive indicator than survival of the susceptibility of fathead minnows to toxicants.
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	Robust Study Summaries Fo	rm: Ac	uatic i	Т			
No	Item	Weight	Yes/No	Specify			
1	Reference: The effects of lesser known metals and one organic to fathead minnows (<i>Pimephales promelas</i>) and <i>Daphnia magna</i> . Kimball, G.L. 1978. Department of Entomology, Fisheries and Wildlife, University of Minnesota.						
2	Substance identity: CAS RN	n/a		10393494			
3	Substance identity: chemical name(s)	n/a		Cobalt sulphate			
4	Chemical composition of the substance	2	Υ				
5	Chemical purity	1	Υ	Reagent grade			
6	Persistence/stability of test substance in aquatic solution reported?	1		N/A			
	Method						
7	Reference	1	N				
8	OECD, EU, national, or other standard method?	3	N				
9	Justification of the method/protocol if not a standard method was used	2	Y				
10	GLP (Good Laboratory Practice)	3		N/A			
	Test organism	•	<u>I</u>				
11	Organism identity: name	n/a		Daphnia magna			
12	Latin or both Latin & common names reported?	1	Υ	- 17 - 23 - 23			
13	Life cycle age / stage of test organism	1	Υ	12 +/- 12 hours old			
14	Length and/or weight	1	-	N/A			
15	Sex	1		Assume to be female.			
16	Number of organisms per replicate	1	Υ	1			
17	Organism loading rate	1	N				
18	Food type and feeding periods during the acclimation period	1	N				
	Test design / condition	ns					
19	Test type (acute or chronic	n/a		Chronic			
20	Experiment type (laboratory or field	n/a		Lab			
21	Exposure pathways (food, water, both)	n/a		Water			
22	Exposure duration	n/a		28d			
23	Negative or positive controls (specify)	1	Υ	Negative			
24	Number of replicates (including controls)	1	Υ	10			
25	Nominal concentrations reported?	1	N				
26	Measured concentrations reported?	3	N				
27	Food type and feeding periods during the long-term tests	1	Y				
28	Were concentrations measured periodically (especially in the chronic test)?	1	Y				
29	Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature)	3	Y	Temperature: 20.3 C, pH:8.31, Dissolved oxygen: 7.45 mg/L			
30	Photoperiod and light intensity	1	N				
31	Stock and test solution preparation	1	Υ				
32	Was solubilizer/emulsifier used, if the chemical was poorly soluble or unstable?	1		N/A			
33	If solubilizer/emulsifier was used, was its concentration reported?	1		N/A			

If solubilizer/emulsifier was used, was its ecotoxicity reported?	1		N/A
Analytical monitoring intervals	1	Υ	
Statistical methods used	1	Υ	
Information relevant to the da	ata qualit	У	
Was the endpoint directly caused by the chemical's toxicity, not by organism's health (e.g. when mortality in the control >10%) or physical effects (e.g. 'shading effect')?	n/a	N	Did not report control organisms health/reponse
Was the test organism relevant to the Canadian environment?	3	Υ	
Were the test conditions (pH, temperature, DO, etc.) typical for the test organism?	1	Υ	
Does system type and design (static, semi-static, flow-through; sealed or open; etc.) correspond to the substance's properties and organism's nature/habits?	2	Υ	
Was pH of the test water within the range typical for the Canadian environment (6 to 9)?	1	Υ	Mean 8.31
Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)?	1	Υ	Mean 20.3
Was toxicity value below the chemical's water solubility?	3	Υ	
Results			
Toxicity values (specify endpoint and value)	n/a	n/a	28 day LC50: 27 ug Co/L 28 day MATC (reproduction): 6.4 ug Co/L; 28 day LOEC (reproduction): 4.4 ug Co/L
Other endpoints reported - e.g. BCF/BAF, LOEC/NOEC (specify)?	n/a		
Other adverse effects (e.g. carcinogenicity, mutagenicity) reported?	n/a	N	
Score: %			72.5
EC Reliability code:			2
Reliability category (high, satisfactory, low):	8	Satisfact	ory Confidence
Comments	Survival was not as sensitive an indicator as reproduction. The authors found that of the metals tested, cobalt was the most sensitive (for survival). Beryllium and cobalt were the first and second most toxic to reproduction (of the metals tested).		
	reported? Analytical monitoring intervals Statistical methods used Information relevant to the day Was the endpoint directly caused by the chemical's toxicity, not by organism's health (e.g. when mortality in the control >10%) or physical effects (e.g. 'shading effect')? Was the test organism relevant to the Canadian environment? Were the test conditions (pH, temperature, DO, etc.) typical for the test organism? Does system type and design (static, semi-static, flow-through; sealed or open; etc.) correspond to the substance's properties and organism's nature/habits? Was pH of the test water within the range typical for the Canadian environment (6 to 9)? Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)? Was toxicity value below the chemical's water solubility? Results Toxicity values (specify endpoint and value) Other endpoints reported - e.g. BCF/BAF, LOEC/NOEC (specify)? Other adverse effects (e.g. carcinogenicity, mutagenicity) reported? Score: % EC Reliability category (high, satisfactory, low):	reported? Analytical monitoring intervals Statistical methods used Information relevant to the data qualit Was the endpoint directly caused by the chemical's toxicity, not by organism's health (e.g. when mortality in the control >10%) or physical effects (e.g. 'shading effect')? Was the test organism relevant to the Canadian environment? Were the test conditions (pH, temperature, DO, etc.) typical for the test organism? Does system type and design (static, semi-static, flow-through; sealed or open; etc.) correspond to the substance's properties and organism's nature/habits? Was pH of the test water within the range typical for the Canadian environment (6 to 9)? Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)? Was toxicity value below the chemical's water solubility? Results Toxicity values (specify endpoint and value) of the radverse effects (e.g. carcinogenicity, mutagenicity) reported? Score: % EC Reliability code: Reliability category (high, satisfactory, low): Surviva indicate authors tested, (for survivaries)	reported? Analytical monitoring intervals Statistical methods used Information relevant to the data quality Was the endpoint directly caused by the chemical's toxicity, not by organism's health (e.g. when mortality in the control >10%) or physical effects (e.g. 'shading effect')? Was the test organism relevant to the Canadian environment? Were the test conditions (pH, temperature, DO, etc.) typical for the test organism? Does system type and design (static, semi-static, flow-through, sealed or open, etc.) correspond to the substance's properties and organism's nature/habits? Was pH of the test water within the range typical for the Canadian environment (6 to 9)? Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)? Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)? Was toxicity value below the chemical's water 3 Y South S

Reference: Effects of cadmium, cobalt, copper, and nickel on growth of the green alaga Chlamydomonas reinhardii: The influences of the cell wall and ph. Macfie, S.M., Tarmohamed, Y., and Welbourn, P.M. 1994. Archives of Environmental Contamination and Toxicol. 27: 454-458. Substance identity: CAS RN		Robust Study Summaries For	rm: Aq	uatic i	Γ
Test organism identity: name Collamydomonas reinharditi: The influences of the cell wall and p.H. Macfie, S.M., Tarmohamed, Y., and Welbourn, P.M. 1994. Archives of Environmental Contamination and Toxicol. 27: 454-458. Substance identity: CAS RN	No	Item	Weight	Yes/No	Specify
3 Substance identity: chemical name(s)	1	Chlamydomonas reinhardtii: The influences of the cell wa Y., and Welbourn, P.M. 1994. Archives of Environmental	. Macfie,	S.M., Tarmohamed,	
4 Chemical composition of the substance 2 Y Chemical purity 1 N N Persistence/stability of test substance in aquatic solution reported?	2	Substance identity: CAS RN	n/a		7646799
5 Chemical purity 6 Persistence/stability of test substance in aquatic solution reported? Method	3		n/a	Υ	Cobalt chloride
Persistence/stability of test substance in aquatic solution reported? Method Test reported Test reporte	4	Chemical composition of the substance	2	Υ	
Solution reported? New York	5	Chemical purity	1	N	
7 Reference 8 OECD, EU, national, or other standard method? 9 Justification of the method/protocol if not a standard method was used 10 GLP (Good Laboratory Practice) 11 Organism identity: name 11 Organism identity: name 12 Latin or both Latin & common names reported? 13 Life cycle age / stage of test organism 14 Length and/or weight 15 Sex 16 Number of organisms per replicate 17 Organism loading rate 18 Food type and feeding periods during the acclimation period 19 Exposure pathways (food, water, both) 20 Experiment type (laboratory or field) 21 Exposure duration 22 Exposure duration 23 Negative or positive controls (specify) 24 Number of replicates (including controls) 25 Measured concentrations reported? 26 Measured concentrations reported? 27 Food type and feeding periods during the long-term type (laboratory or field) 28 Measured concentrations reported? 30 Photoperiod and light intensity 31 Poot type and feeding periods during the long-term type (laboratory or field) 31 N N/A 32 N N/A 33 N N/A 34 Exposure pathways (food, water, both) 35 N N/A 36 Measured concentrations reported? 37 Food type and feeding periods during the long-term tests 38 Measured concentrations reported? 39 Photoperiod and light intensity 40 Photoperiod and light intensity 41 N Temperature: 25 +/- 2 C, pH: 6.8 46 Continuous light, 86 4/- 10 umol/m^2/s/s	6		1		N/A
8 OECD, EU, national, or other standard method? 9 Justification of the method/protocol if not a standard method was used 10 GLP (Good Laboratory Practice) 11 Organism identity: name 12 Latin or both Latin & common names reported? 11 Life cycle age / stage of test organism 12 Life cycle age / stage of test organism 13 Life cycle age / stage of test organism 14 Length and/or weight 15 Sex 1 N/A 16 Number of organisms per replicate 17 Organism loading rate 18 Food type and feeding periods during the acclimation period 19 Test type (acute or chronic) 20 Experiment type (laboratory or field) 21 Exposure pathways (food, water, both) 22 Exposure duration 23 Negative or positive controls (specify) 24 Number of replicates (including controls) 25 Nominal concentrations reported? 26 Measured concentrations reported? 27 Food type and feeding periods during the long-term tests 28 Measured concentrations measured periodically (especially in the chronic test)? 30 Photoperiod and light intensity 31 Y 32 Temperature: 25 +/- 2 C, pH: 6.8 4 Continuous light, 86 +/- 10 umol/m²2/s		Method			
9 Justification of the method/protocol if not a standard method was used 10 GLP (Good Laboratory Practice) 11 Organism identity: name 12 Latin or both Latin & common names reported? 1 Y 13 Life cycle age / stage of test organism 1 1 Y 14 Length and/or weight 15 Sex 1 1 N/A 16 Number of organisms per replicate 17 Organism loading rate 18 Food type and feeding periods during the acclimation period 19 Test type (acute or chronic) 20 Experiment type (laboratory or field) 21 Exposure pathways (food, water, both) 22 Exposure duration 23 Negative or positive controls (specify) 24 Number of replicates (including controls) 25 Measured concentrations reported? 26 Measured concentrations measured periodically (especially in the chronic test)? 27 Food type and feeding periods during the long-term tests 28 Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature) 30 Photoperiod and light intensity 1 Y Continuous light, 86 +/- 10 umol/m^2/s	7	Reference	1	N	
method was used 2 Y N/A GLP (Good Laboratory Practice) 3 N/A Test organism 11 Organism identity: name n/a Chlamydomonas reinhardtii 12 Latin or both Latin & common names reported? 1 Y Exponential growth phase. 13 Life cycle age / stage of test organism 1 Y Exponential growth phase. 14 Length and/or weight 1 N/A 15 Sex 1 N/A 16 Number of organisms per replicate 1 N N/A 17 Organism loading rate 1 N N/A 18 Food type and feeding periods during the acclimation period N/A 19 Test type (acute or chronic) n/a Lab Exposure pathways (food, water, both) n/a Water 21 Exposure duration n/a 5 days 22 Negative or positive controls (specify) 1 Y Negative 23 Negative or positive controls (specify) 1 Y Negative 24 Number of replicates (including controls) 1 Y 3 25 Nominal concentrations reported? 1 Y 50, 60, 70, 80, 100, 150, 200 uM) 26 Measured concentrations reported? 3 N/A 27 Food type and feeding periods during the long-term tests 29 Were concentrations measured periodically (especially in the chronic test)? 1 N/A Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity -pH, DOC/TOC, water hardness, temperature) 1 Y Continuous light, 86 +/- 10 umol/m^2/s	8	OECD, EU, national, or other standard method?	3	Ν	
Test organism 11 Organism identity: name 12 Latin or both Latin & common names reported? 13 Life cycle age / stage of test organism 14 Length and/or weight 15 Sex 16 Number of organisms per replicate 17 Organism loading rate 18 Food type and feeding periods during the acclimation period 19 Test type (acute or chronic) 20 Experiment type (laboratory or field) 21 Exposure pathways (food, water, both) 22 Exposure duration 23 Negative or positive controls (specify) 24 Number of replicates (including controls) 1 Y Negative 25 Nominal concentrations reported? 26 Measured concentrations reported? 27 Food type and feeding periods during the long-term tests 28 Were concentrations measured periodically (especially in the chronic test)? Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature) 10 Organism identity: name reported in hy A Exponential growth phase. 11 Y Continuous light, 86 +/- 10 umol/m^2/s	9		2	Υ	
11 Organism identity: name 12 Latin or both Latin & common names reported? 1 Y 13 Life cycle age / stage of test organism 1 Y 14 Length and/or weight 1 N/A 15 Sex 1 N/A 16 Number of organisms per replicate 17 Organism loading rate 18 Food type and feeding periods during the acclimation period 19 Test type (acute or chronic) 20 Experiment type (laboratory or field) 21 Exposure pathways (food, water, both) 22 Exposure duration 23 Negative or positive controls (specify) 24 Number of replicates (including controls) 25 Nominal concentrations reported? 26 Measured concentrations reported? 27 Food type and feeding periods during the long-term tests 28 Were concentrations measured periodically (especially in the chronic test)? 30 Photoperiod and light intensity 1 Y 1 Continuous light, 86 +/- 10 umol/m^2/s	10	GLP (Good Laboratory Practice)	3		N/A
12 Latin or both Latin & common names reported? 13 Life cycle age / stage of test organism 14 Length and/or weight 15 Sex 16 Number of organisms per replicate 17 Organism loading rate 18 Food type and feeding periods during the acclimation period 19 Test type (acute or chronic) 20 Experiment type (laboratory or field) 21 Exposure pathways (food, water, both) 22 Exposure duration 23 Negative or positive controls (specify) 24 Number of replicates (including controls) 25 Nominal concentrations reported? 26 Measured concentrations reported? 27 Food type and feeding periods during the acclimation n/a 28 Were concentrations measured periodically (especially in the chronic test)? 29 Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature) 10 If exposure pathways (food, water, both) 11 Y Sont (and in the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature) 10 If exponential growth phases. 11 N Continuous light, 86 +/-10 umol/m^2/s		Test organism			
Life cycle age / stage of test organism 1	11	Organism identity: name	n/a		
Lile cycle age / stage of test organism Length and/or weight Length and/or weight N/A Nowmber of organisms per replicate Norganism loading rate Pood type and feeding periods during the acclimation period Test design / conditions Test design / conditions Test type (acute or chronic) Experiment type (laboratory or field) Exposure pathways (food, water, both) Rogative or positive controls (specify) Number of replicates (including controls) Nominal concentrations reported? Measured concentrations reported? Measured concentrations reported? Measured concentrations measured periodically (especially in the chronic test)? Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature) In phase. N/A N/A N/A N/A Chronic Chronic N/A Water S days Negative Y Negative 1 Y Negative 1 1 Y So, 60, 70, 80, 100, 150, 200 uM) N/A N/A Temperature: 25 +/- 2 C, pH: 6.8	12	Latin or both Latin & common names reported?	1	Υ	
15 Sex 1 1 N/A 16 Number of organisms per replicate 1 N 17 Organism loading rate 1 N 18 Food type and feeding periods during the acclimation period 1 N/A Test design / conditions 19 Test type (acute or chronic) n/a Chronic 20 Experiment type (laboratory or field) n/a Lab 21 Exposure pathways (food, water, both) n/a Water 22 Exposure duration n/a 5 days 23 Negative or positive controls (specify) 1 Y Negative 24 Number of replicates (including controls) 1 Y 3 25 Nominal concentrations reported? 1 Y 50, 60, 70, 80, 100, 150, 200 uM) 26 Measured concentrations reported? 3 N 27 Food type and feeding periods during the long-term tests 1 N/A 28 Were concentrations measured periodically (especially in the chronic test)? 29 Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity -pH, DOC/TOC, water hardness, temperature) 1 Y Continuous light, 86 +/- 10 umol/m^2/s	13	Life cycle age / stage of test organism	1	Y	
16 Number of organisms per replicate 1 N	14	Length and/or weight	1		N/A
Test design / conditions Test design / conditions Test type (acute or chronic) Experiment type (laboratory or field) Exposure pathways (food, water, both) Negative or positive controls (specify) Nominal concentrations reported? Measured concentrations reported? Measured concentrations measured periodically (especially in the chronic test)? Were the exposure media conditions reported? Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature) 1 N/A N/A Chronic N/A Chronic A Vater S days S days 1 Y Negative 1 Y So, 60, 70, 80, 100, 150, 60, 70, 80, 100, 150, 200 uM) N/A 1 N/A Temperature: 25 +/- 2 C, pH: 6.8 -/- 10 umol/m^2/s	15	Sex	1		N/A
Food type and feeding periods during the acclimation period Test design / conditions 1 N/A Test type (acute or chronic) 1 N/A Test type (acute or chronic) 20 Experiment type (laboratory or field) 1 Exposure pathways (food, water, both) 21 Exposure duration 22 Exposure duration 23 Negative or positive controls (specify) 24 Number of replicates (including controls) 25 Nominal concentrations reported? 26 Measured concentrations reported? 27 Food type and feeding periods during the long-term tests 28 Were concentrations measured periodically (especially in the chronic test)? 29 Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature) 1 N Continuous light, 86 +/- 10 umol/m^2/s	16	Number of organisms per replicate	1	N	
Test design / conditions 19 Test type (acute or chronic)	17	Organism loading rate	1	N	
Test type (acute or chronic) Texperiment type (laboratory or field) Experiment type (laboratory or field) Exposure pathways (food, water, both) Exposure pathways (food, water, both) Exposure duration Negative or positive controls (specify) Number of replicates (including controls) Nominal concentrations reported? Nominal concentrations reported? Measured concentrations reported? Measured concentrations reported? Measured concentrations reported? Mere concentrations measured periodically (especially in the chronic test)? Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature) Photoperiod and light intensity n/a Water Nature Value Va	18		1		N/A
Experiment type (laboratory or field) Propose Experiment type (laboratory or field) Exposure pathways (food, water, both) Regative Exposure duration Regative or positive controls (specify) Negative or positive controls (specify) Number of replicates (including controls) Nominal concentrations reported? Nominal concentrations reported? Regative 1		Test design / condition	าร		
21 Exposure pathways (food, water, both) 22 Exposure duration 23 Negative or positive controls (specify) 24 Number of replicates (including controls) 25 Nominal concentrations reported? 26 Measured concentrations reported? 27 Food type and feeding periods during the long-term tests 28 Were concentrations measured periodically (especially in the chronic test)? 29 Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature) 1 Y Sdays 1 Y Negative 1 12 (0, 5, 20, 30, 40, 50, 60, 70, 80, 100, 150, 200 uM) 1 N/A 1 N/A 1 N 1 Temperature: 25 +/- 2 C, pH: 6.8 29 Photoperiod and light intensity 1 Y Continuous light, 86 +/- 10 umol/m^2/s	19	Test type (acute or chronic)	n/a		Chronic
22 Exposure duration 23 Negative or positive controls (specify) 24 Number of replicates (including controls) 25 Nominal concentrations reported? 26 Measured concentrations reported? 27 Food type and feeding periods during the long-term tests 28 Were concentrations measured periodically (especially in the chronic test)? 29 Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature) 30 Photoperiod and light intensity 3 N N N/A 5 days 5 days 5 days 5 days 6 Negative 7 N Negative 7 12 (0, 5, 20, 30, 40, 50, 60, 70, 80, 100, 150, 200 uM) 7 N/A 7 N/A 8 N/A 8 N/A 8 N/A 8 N/A 8 Temperature: 25 +/-2 C, pH: 6.8 8 -/- 10 umol/m^2/s	20	Experiment type (laboratory or field)	n/a		Lab
Negative or positive controls (specify) Number of replicates (including controls) Nominal concentrations reported? Nominal concentrations reported? Measured concentrations reported? Measured concentrations reported? Measured concentrations reported? Measured concentrations reported? Nominal concentratio			n/a		Water
Number of replicates (including controls) 1 Y 3 Nominal concentrations reported? 1 Y 50, 60, 70, 80, 100, 150, 200 uM) Measured concentrations reported? 3 N Food type and feeding periods during the long-term tests Were concentrations measured periodically (especially in the chronic test)? Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature) N Continuous light, 86 +/- 10 umol/m^2/s	22	•	n/a		5 days
Nominal concentrations reported? 1 Y 50, 60, 70, 80, 100, 150, 200 uM) 26 Measured concentrations reported? 3 N 27 Food type and feeding periods during the long-term tests 1 N/A 28 Were concentrations measured periodically (especially in the chronic test)? Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature) 3 N N/A Temperature: 25 +/-2 C, pH: 6.8 Photoperiod and light intensity 1 Y Continuous light, 86 +/- 10 umol/m^2/s					Negative
Nominal concentrations reported? Nominal concentrations reported? Measured concentrations reported? Nominal concentrations reported? Measured concentrations reported? Food type and feeding periods during the long-term tests Nominal concentrations reported? Nominal concen	24	Number of replicates (including controls)	1	Y	
Food type and feeding periods during the long-term tests Were concentrations measured periodically (especially in the chronic test)? Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature) Photoperiod and light intensity 1 N Temperature: 25 +/- 2 C, pH: 6.8 Photoperiod and light intensity 1 Y Continuous light, 86 +/- 10 umol/m^2/s	25	Nominal concentrations reported?	1	Y	50, 60, 70, 80, 100,
tests Were concentrations measured periodically (especially in the chronic test)? Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature) Photoperiod and light intensity 1 N Temperature: 25 +/- 2 C, pH: 6.8 Continuous light, 86 +/- 10 umol/m^2/s	26	Measured concentrations reported?	3	Ν	
in the chronic test)? Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature) 3 Y Temperature: 25 +/- 2 C, pH: 6.8 Photoperiod and light intensity 1 Y Continuous light, 86 +/- 10 umol/m^2/s	27		1		N/A
29 particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature) 3 Y Temperature. 25 +/- 2 C, pH: 6.8 30 Photoperiod and light intensity 1 Y Continuous light, 86 +/- 10 umol/m^2/s	28		1	N	
+/- 10 umol/m^2/s	29	particular chemical reported? (e.g., for the metal toxicity	3	Y	
31 Stock and test solution preparation 1 Y	30	Photoperiod and light intensity	1	Υ	
	31	Stock and test solution preparation	1	Y	

	MALE I de Mine of a sector of the sector			
32	Was solubilizer/emulsifier used, if the chemical was poorly soluble or unstable?	1		N/A
33	If solubilizer/emulsifier was used, was its concentration reported?	1		N/A
34	If solubilizer/emulsifier was used, was its ecotoxicity reported?	1		N/A
35	Analytical monitoring intervals	1	N	
36	Statistical methods used	1	Υ	
	Information relevant to the da	ta quality	/	
37	Was the endpoint directly caused by the chemical's toxicity, not by organism's health (e.g. when mortality in the control >10%) or physical effects (e.g. 'shading effect')?	n/a	Y	
38	Was the test organism relevant to the Canadian environment?	3	Y	
39	Were the test conditions (pH, temperature, DO, etc.) typical for the test organism?	1	Υ	
40	Does system type and design (static, semi-static, flow-through; sealed or open; etc.) correspond to the substance's properties and organism's nature/habits?	2	Y	
41	Was pH of the test water within the range typical for the Canadian environment (6 to 9)?	1	Y	6.8
42	Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)?	1	Υ	25 +/- 2
43	Was toxicity value below the chemical's water solubility?	3	Υ	
	Results			
44	Toxicity values (specify endpoint and value)	n/a	n/a	5 day EC30: 1 120 μg Co/L (19.0μΜ) - Walled strain
45	Other endpoints reported - e.g. BCF/BAF, LOEC/NOEC (specify)?	n/a		
46	Other adverse effects (e.g. carcinogenicity, mutagenicity) reported?	n/a		
47	Score: %			68.4
48	EC Reliability code:	2		
49	Reliability category (high, satisfactory, low):	Satisfactory Confidence		
50	Comments	5 day EC30: 318 ug/L (5.4uM) - Wall- less strain. The data suggests that the algal cell wall provides some protection from toxic concentrations of some metals.		

	Robust Study Summaries Form: Aquatic iT					
No	Item	Weight	Yes/No	Specify		
1	Reference: Isolation, growth, ultrastruture, and metal tole <i>Chlamydomonas acidophila</i> (Chlorophyta). Nishikawa, K. Biotechnology, Biochemistry. 65 (12). 2650-2656.					
2	Substance identity: CAS RN	n/a		7646799		
3	Substance identity: chemical name(s)	n/a		Cobalt chloride		
	Chemical composition of the substance	2	Υ			
	Chemical purity	1	N			
6	Persistence/stability of test substance in aquatic solution reported?	1		N/A		
	Method					
7	Reference	1	N			
8	OECD, EU, national, or other standard method?	3	N			
	Justification of the method/protocol if not a standard method was used	2	Υ			
10	GLP (Good Laboratory Practice)	3	N			
-	Test organism					
11	Organism identity: name	n/a		Chlamydomonas acidophila (Chlorophyta)		
12	Latin or both Latin & common names reported?	1	Υ			
13	Life cycle age / stage of test organism	1	Υ	Exponential growth phase (5-7 days)		
14	Length and/or weight	1		N/A		
	Sex	1		N/A		
16	Number of organisms per replicate	1	Y	Concentration of 5 x 10^5 cells/ml. 10 ml. Therefore 5 x 10^6 cells		
17	Organism loading rate	1	N			
1X I	Food type and feeding periods during the acclimation period	1		N/A		
	Test design / condition	าร				
19	Test type (acute or chronic	n/a		Chronic		
20	Experiment type (laboratory or field	n/a		Lab		
21	Exposure pathways (food, water, both)	n/a		Water		
	Exposure duration	n/a		96 hr		
23	Negative or positive controls (specify)	1	Υ	Negative		
24	Number of replicates (including controls)	1	Υ	3		
25	Nominal concentrations reported?	1	Y	4 (0, 10, 50, 100 uM)		
26	Measured concentrations reported?	3	N			
7/	Food type and feeding periods during the long-term tests	1		N/A		
	Were concentrations measured periodically (especially in the chronic test)?	1	N			
	in the emonic testy:					
29	Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature)	3	Υ	Temperature: 20 C, pH: 4.0		

50	Comments	Test species is one that inhabits acidified lakes in Japan. In the study, 69.5% of Co was in free form. The authors found that compared to other green algae, C. acidophila is more tolerant to metals.		
49	Reliability category (high, satisfactory, low):	S	atisfacto	ry Confidence
48	EC Reliability code:	2		
47	Score: %			63.4
46	Other adverse effects (e.g. carcinogenicity, mutagenicity) reported?	n/a	N	
45	Other endpoints reported - e.g. BCF/BAF, LOEC/NOEC (specify)?	n/a	N	,
44	Toxicity values (specify endpoint and value)	n/a	n/a	96 hr EC50 (growth): 69.5uM or 4096 ug(free, Co2+)/L
.0	solubility?		<u> </u>	
43	Was toxicity value below the chemical's water	3	Y	
42	Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)?	1	Y	20
41	Was pH of the test water within the range typical for the Canadian environment (6 to 9)?	1	N	4
40	Does system type and design (static, semi-static, flow-through; sealed or open; etc.) correspond to the substance's properties and organism's nature/habits?	2	Y	
39	Were the test conditions (pH, temperature, DO, etc.) typical for the test organism?	1	Υ	
38	Was the test organism relevant to the Canadian environment?	3	Υ	
37	Was the endpoint directly caused by the chemical's toxicity, not by organism's health (e.g. when mortality in the control >10%) or physical effects (e.g. 'shading effect')?	n/a	Y	
	Information relevant to the da	ta quality	L	
36	Statistical methods used	1	Y	APHA
34 35	reported? Analytical monitoring intervals	1	N	N/A
	reported? If solubilizer/emulsifier was used, was its ecotoxicity			
33	poorly soluble or unstable? If solubilizer/emulsifier was used, was its concentration	1		N/A
32	Was solubilizer/emulsifier used, if the chemical was	1	'	N/A
31	Stock and test solution preparation	1	Υ	

	Robust Study Summaries Form: Aquatic iT					
No	Item	Weight	Yes/No	Specify		
Reference: Chronic toxicity of arsenic, cobalt, chromium and manganese to <i>Hyalella azteca</i> in relation to exposure and bioaccumulation. Norwood, W.P., Borgmann, U., and Dixon, D.G. 2007. Environmental Pollution 147: 262-272						
2	Substance identity: CAS RN	n/a		7646799		
3	Substance identity: chemical name(s)	n/a		cobalt chloride (CoCl2*6H2O)		
4	Chemical composition of the substance	2	Υ			
5	Chemical purity	1	Y	analyical grade salts		
6	Persistence/stability of test substance in aquatic solution reported?	1		N/A		
	Method	•				
7	Reference	1	Y	Described in Norwood et al 2006 for chronic 4-week test methods		
8	OECD, EU, national, or other standard method?	3	N			
0	Justification of the method/protocol if not a standard method was used	2	Υ			
10	GLP (Good Laboratory Practice)	3	N			
	Test organism					
11	Organism identity: name	n/a		Hyalella azteca		
12	Latin or both Latin & common names reported?	1	Υ			
13	Life cycle age / stage of test organis	1	Υ	0-1 week old		
14	Length and/or weight	1		n/a		
15	Sex	1		n/a		
16	Number of organisms per replicate	1	Υ	20		
17	Organism loading rate	1	N			
18	Food type and feeding periods during the acclimation period	1	N	not indicated in study		
	Test design / condition	ns				
19	Test type (acute or chronic	n/a		chronic		
20	Experiment type (laboratory or field	n/a		laboratory		
21	Exposure pathways (food, water, both)	n/a		water		
22	Exposure duration	n/a		28 days		
23	Negative or positive controls (specify)	1	Υ	Negative controls		
24	Number of replicates (including controls)	1	Y	Two replicates per concentration series, controls run in triplicate		
25	Nominal concentrations reported?	1	N			
26	Measured concentrations reported?	3	N			

27	Food type and feeding periods during the long-term tests	1	Y	Food additions (TetraMin fish food flakes ground to 500 mm mesh size), consisted of two 2.5-mg feedings during weeks 1 and 2, three 2.5-mg feedings in week 3, and two 5.0-mg feedings in week 4. The increase in food per week was incorporated to allow for a		
28	Were concentrations measured periodically (especially in the chronic test)?	1	Y	measured weekly and at the end of the28 day exposure period		
29	Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature)	3	Y	Measured according to methods, but not reported in this study. Only temperature was reported: 25C. Hardness reported of 122 mg/L as CaCO3 for the same reconstituted water recipe (Norwood et al. 2006).		
30	Photoperiod and light intensity	1	Υ	16 h light/8 h dark photoperiod		
31	Stock and test solution preparation	1	Υ	from analyical grade salts, diluted with de-ionized water		
32	Was solubilizer/emulsifier used, if the chemical was poorly soluble or unstable?	1		n/a		
33	If solubilizer/emulsifier was used, was its concentration reported?	1		n/a		
34	If solubilizer/emulsifier was used, was its ecotoxicity reported?	1		n/a		
35	Analytical monitoring intervals	1	Υ	weekly		
36	Statistical methods used	1	Y	all models were fit using a non-linear regressions in Systat 10 (estimates with 95% CI for all parameters)		
	Information relevant to the data quality					
37	Was the endpoint directly caused by the chemical's toxicity, not by organism's health (e.g. when mortality in the control >10%) or physical effects (e.g. 'shading effect')?	n/a	Y	Yes. All control mortality was under 10%		

38	Was the test organism relevant to the Canadian environment?	3	Υ	
39	Were the test conditions (pH, temperature, DO, etc.) typical for the test organism?	1	Y	
40	Does system type and design (static, semi-static, flow-through; sealed or open; etc.) correspond to the substance's properties and organism's nature/habits?	2	Y	weekly static renewal
41	Was pH of the test water within the range typical for the Canadian environment (6 to 9)?	1	Y	Did not report but 8.2 in Norwood et al. 2006 (for same reconstituted water recipe)
42	Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)?	1	Υ	25C
43	Was toxicity value below the chemical's water solubility?	3	Υ	
	Results	•	•	
44	Toxicity values (specify endpoint and value)	n/a	Y	28 d LC50:183nmol Co/L, 28 d LC25: 68 nmol Co/L, 28 d IC25 (growth):48.7nmol Co/L (= 2.9 ug Co/L)
45	Other endpoints reported - e.g. BCF/BAF, LOEC/NOEC (specify)?	n/a	Y	LBC25, LBC50 (lethal body concentration), IBC25 (inhibitation of growth body concentration)
46	Other adverse effects (e.g. carcinogenicity, mutagenicity) reported?	n/a	N	
47	Score: %			72.1
48	B EC Reliability code: 2			
49	Reliability category (high, satisfactory, low):	Satisfactory Confidence		
50	Comments	Mortality gradually increased with increasing Co exposure (unlike with As). The authors noted considerable variation in growth at the low and control concentrations of Co.		

Short-term (acute)

	Robust Study Summaries Form: Aquatic iT					
No	Item	Weight	Yes/No	Specify		
1	Reference: Acute toxicity of various metals to freshwater Scoppa, P. 1974. Bulletin of Environmental Contamination					
2	Substance identity: CAS RN	n/a		7646799		
3	Substance identity: chemical name(s)	n/a		Cobalt chloride (CoCl2*6H20)		
4	Chemical composition of the substance	2	Y			
5	Chemical purity	1	Υ	Reagent-grade		
6	Persistence/stability of test substance in aquatic solution reported?	1		N/A		
	Method					
7	Reference	1	N			
8	OECD, EU, national, or other standard method?	3	N			
9	Justification of the method/protocol if not a standard method was used	2	Y			
10	GLP (Good Laboratory Practice)	3		N/A		
	Test organism					
11	Organism identity: name	n/a		Cyclops abyssorum prealpinus		
12	Latin or both Latin & common names reported?	1	Υ			
13	Life cycle age / stage of test organis	1	Υ	Adults		
14	Length and/or weight	1	Υ	0.62mm		
15	Sex	1	N			
16	Number of organisms per replicate	1	Υ	1 (to avoid cannabalism)		
17	Organism loading rate	1	N			
18	Food type and feeding periods during the acclimation period	1	N			
	Test design / condition	ns				
19	Test type (acute or chronic	n/a		Acute		
20	Experiment type (laboratory or field	n/a		Lab		
21	Exposure pathways (food, water, both)	n/a		Water		
22	Exposure duration	n/a		48hr		
23	Negative or positive controls (specify)	1	Υ	Negative		
24	Number of replicates (including controls)	1	Υ	5 to 20		
25	Nominal concentrations reported?	1	N			
26	Measured concentrations reported?	3	N			
27	Food type and feeding periods during the long-term tests	1	Y	No feeding		
28	Were concentrations measured periodically (especially in the chronic test)?	1	N			
29	Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature)	3	Y	Temperature: 10 +/- 0.5, pH: 7.2, Conductivity 75 uS, alkalinity, 0.58 meg/L		
30	Photoperiod and light intensity	1	Υ	12 hr photoperiod, 70 lux		

31	Stock and test solution preparation	1	Y	Reagent-grade salt diluted in lake water
32	Was solubilizer/emulsifier used, if the chemical was poorly soluble or unstable?	1		N/A
33	If solubilizer/emulsifier was used, was its concentration reported?	1		N/A
34	If solubilizer/emulsifier was used, was its ecotoxicity reported?	1		N/A
35	Analytical monitoring intervals	1	N	
36	Statistical methods used	1	Υ	log-probit
	Information relevant to the da	ta quality	/	
37	Was the endpoint directly caused by the chemical's toxicity, not by organism's health (e.g. when mortality in the control >10%) or physical effects (e.g. 'shading effect')?	n/a	Y	Controls showed less than 1% mortality
38	Was the test organism relevant to the Canadian environment?	3	Υ	
39	Were the test conditions (pH, temperature, DO, etc.) typical for the test organism?	1	Y	
40	Does system type and design (static, semi-static, flow-through; sealed or open; etc.) correspond to the substance's properties and organism's nature/habits?	2	Υ	
41	Was pH of the test water within the range typical for the Canadian environment (6 to 9)?	1	Υ	7.2
42	Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)?	1	Υ	10 (9.5-10.5)
43	Was toxicity value below the chemical's water solubility?	3	Υ	
	Results			
44	Toxicity values (specify endpoint and value)	n/a	n/a	Endpoint in mg total Co/L, with 95% CL. 48 hr LC50: 15.5 (18.8-12.8)
45	Other endpoints reported - e.g. BCF/BAF, LOEC/NOEC (specify)?	n/a	N	
46	Other adverse effects (e.g. carcinogenicity, mutagenicity) reported?	n/a	N	
47	Score: %			69.0
48	EC Reliability code: 2			
49	Reliability category (high, satisfactory, low):	S	atisfacto	ory Confidence
50	Comments	Calculated 48 hr endpoints, however, species were observed for longer unspecified periods of time (response during the period was also not described). The study tested 13 different compounds.		

Robust Study Summaries Form: Aquatic iT					
No	Item	Weight	Yes/No	Specify	
1	Reference: Acute toxicity of various metals to freshwater Scoppa, P. 1974. Bulletin of Environmental Contaminatio				
2	Substance identity: CAS RN	n/a		7646799	
3	Substance identity: chemical name(s)	n/a		Cobalt chloride (CoCl2*6H20)	
4	Chemical composition of the substance	2	Υ		
5	Chemical purity	1	Υ	Reagent-grade	
6	Persistence/stability of test substance in aquatic solution reported?	1		N/A	
	Method	T			
7	Reference	1	N		
8	OECD, EU, national, or other standard method?	3	N		
9	Justification of the method/protocol if not a standard method was used	2	Y		
10	GLP (Good Laboratory Practice)	3		N/A	
	Test organism	1			
11	Organism identity: name	n/a		Eudiaptomus padanus	
12	Latin or both Latin & common names reported?	1	Υ		
13	Life cycle age / stage of test organis	1	Υ	Adults	
14	Length and/or weight	1	Υ	0.43mm	
15	Sex	1	N		
16	Number of organisms per replicate	1	Y	1 (to avoid cannabalism)	
17	Organism loading rate	1	Ν		
18	Food type and feeding periods during the acclimation period	1	N		
	Test design / condition	าร			
19	Test type (acute or chronic	n/a		Acute	
20	Experiment type (laboratory or field	n/a		Lab	
21	Exposure pathways (food, water, both)	n/a		Water	
22	Exposure duration	n/a		48hr	
23	Negative or positive controls (specify)	1	Y	Negative	
24	Number of replicates (including controls)	1	Y	5 to 20	
25	Nominal concentrations reported?	1	N		
26	Measured concentrations reported?	3	N		
27	Food type and feeding periods during the long-term tests	1	Y	No feeding	
28	Were concentrations measured periodically (especially in the chronic test)?	1	N		
29	Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature)	3	Y	Temperature: 10 +/- 0.5, pH: 7.2, Conductivity 75 uS, alkalinity, 0.58 meg/L	
30	Photoperiod and light intensity	1	Y	12 hr photoperiod, 70 lux	

31	Stock and test solution preparation	1	Υ	Reagent-grade salt diluted in lake water
32	Was solubilizer/emulsifier used, if the chemical was poorly soluble or unstable?	1		N/A
33	If solubilizer/emulsifier was used, was its concentration reported?	1		N/A
34	If solubilizer/emulsifier was used, was its ecotoxicity reported?	1		N/A
35	Analytical monitoring intervals	1	N	
36	Statistical methods used	1	Υ	log-probit
	Information relevant to the da	ta quality	/	
37	Was the endpoint directly caused by the chemical's toxicity, not by organism's health (e.g. when mortality in the control >10%) or physical effects (e.g. 'shading effect')?	n/a	Y	Controls showed less than 9.8% mortality after 10 days. (test was only 48 hrs)
38	Was the test organism relevant to the Canadian environment?	3	Υ	
39	Were the test conditions (pH, temperature, DO, etc.) typical for the test organism?	1	Υ	
40	Does system type and design (static, semi-static, flow-through; sealed or open; etc.) correspond to the substance's properties and organism's nature/habits?	2	Y	
41	Was pH of the test water within the range typical for the Canadian environment (6 to 9)?	1	Υ	7.2
42	Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)?	1	Υ	10 (9.5-10.5)
43	Was toxicity value below the chemical's water solubility?	3	Υ	
	Results	1	T	
44	Toxicity values (specify endpoint and value)	n/a	n/a	Endpoint in mg total Co/L, with 95% CL. 48 h LC50: 4.0 (8.0- 2.0)
45	Other endpoints reported - e.g. BCF/BAF, LOEC/NOEC (specify)?	n/a	N	
46	Other adverse effects (e.g. carcinogenicity, mutagenicity) reported?	n/a	N	
47	Score: %			69.0
48	EC Reliability code:			2
49	Reliability category (high, satisfactory, low):	S	atisfacto	ry Confidence
50	Comments	Calculated 48 hr endpoints, however, species were observed for longer unspecified periods of time (response during the period was also not described). The study tested 13 different compounds.		

	Robust Study Summaries For	rm: Aq	uatic i	
No	Item		Yes/No	Specify
1	Reference: Acute toxicity of various metals to freshwater Scoppa, P. 1974. Bulletin of Environmental Contaminatio			
2	Substance identity: CAS RN	n/a		7646799
3	Substance identity: chemical name(s)	n/a		Cobalt chloride (CoCl2*6H20)
4	Chemical composition of the substance	2	Υ	
5	Chemical purity	1	Υ	Reagent-grade
6	Persistence/stability of test substance in aquatic solution reported?	1		N/A
	Method			
7	Reference	1	N	
8	OECD, EU, national, or other standard method?	3	N	
9	Justification of the method/protocol if not a standard method was used	2	Υ	
10	GLP (Good Laboratory Practice)	3		N/A
	Test organism			
11	Organism identity: name	n/a	Υ	Daphnia hyalina
12	Latin or both Latin & common names reported?	1	Υ	
13	Life cycle age / stage of test organis	1	Υ	Adults
14	Length and/or weight	1	Υ	1.27mm
15	Sex	1		Assume to be female.
16	Number of organisms per replicate	1	Υ	Daphnia: 15-20
17	Organism loading rate	1	N	
18	Food type and feeding periods during the acclimation period	1	N	
	Test design / condition	าร		
19	Test type (acute or chronic	n/a		Acute
20	Experiment type (laboratory or field	n/a		Lab
21	Exposure pathways (food, water, both)	n/a		Water
22	Exposure duration	n/a		48hr
23	Negative or positive controls (specify)	1	Υ	Negative
24	Number of replicates (including controls)	1	Υ	Daphnia: 1
25	Nominal concentrations reported?	1	N	
26	Measured concentrations reported?	3	N	
27	Food type and feeding periods during the long-term tests	1		Not applicable, no feeding
28	Were concentrations measured periodically (especially in the chronic test)?	1	N	
29	Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature)	3	Y	Temperature: 10 +/- 0.5, pH: 7.2, Conductivity 75 uS, alkalinity, 0.58 meg/L
30	Photoperiod and light intensity	1	Υ	12 hr photoperiod, 70 lux
31	Stock and test solution preparation	1	Υ	Reagent-grade salt diluted in lake water

32	Was solubilizer/emulsifier used, if the chemical was poorly soluble or unstable?	1		N/A		
33	If solubilizer/emulsifier was used, was its concentration reported?	1		N/A		
34	If solubilizer/emulsifier was used, was its ecotoxicity reported?	1		N/A		
35	Analytical monitoring intervals	1	N			
36	Statistical methods used	1	Υ	log-probit		
	Information relevant to the data quality					
37	Was the endpoint directly caused by the chemical's toxicity, not by organism's health (e.g. when mortality in the control >10%) or physical effects (e.g. 'shading effect')?	n/a	Y	Controls showed less than 11.2% mortality after 5 days (the test lasted only 48 hrs)		
38	Was the test organism relevant to the Canadian environment?	3	Υ			
39	Were the test conditions (pH, temperature, DO, etc.) typical for the test organism?	1	Y			
40	Does system type and design (static, semi-static, flow-through; sealed or open; etc.) correspond to the substance's properties and organism's nature/habits?	2	Υ			
41	Was pH of the test water within the range typical for the Canadian environment (6 to 9)?	1	Υ	7.2		
42	Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)?	1	Y	10 (9.5-10.5)		
43	Was toxicity value below the chemical's water solubility?	3	Υ			
	Results		T			
44	Toxicity values (specify endpoint and value)	n/a	n/a	Endpoint in mg total Co/L, with 95% CL. 48 h LC50: 1.32 (1.63-1.07) mg/L		
45	Other endpoints reported - e.g. BCF/BAF, LOEC/NOEC (specify)?	n/a	N			
46	Other adverse effects (e.g. carcinogenicity, mutagenicity) reported?	n/a	N			
47	Score: %			70.0		
48	EC Reliability code: 2			2		
49	Reliability category (high, satisfactory, low):	S	atisfacto	ory Confidence		
50	Comments	Calculated 48 hr endpoints, however, species were observed for longer unspecified periods of time (response during the period was also not described). The study tested 13 different compounds.				

	Robust Study Summaries For	m: Aq	uatic i	Т
No	Item	· · · · · · · ·	Yes/No	Specify
1	Reference: Effects of various metals on survival, growth, <i>Daphnia magna</i> . Biesinger, K.,E. and Christensen, G.,M. 1691-1700.			
2	Substance identity: CAS RN	n/a		7646799
3	Substance identity: chemical name(s)	n/a		Cobalt Chloride CoCl2*6H20
4	Chemical composition of the substance	2	Y	
5	Chemical purity	1	Y	Reagent Grade
6	Persistence/stability of test substance in aquatic solution reported?	1		N/A
	Method	1 .		
7	Reference	1	N	
8	OECD, EU, national, or other standard method?	3	N	
9	Justification of the method/protocol if not a standard method was used	2	Υ	
10	GLP (Good Laboratory Practice)	3		N/A
	Test organism		T	
11	Organism identity: name	n/a	V	Daphnia magna
12	Latin or both Latin & common names reported?	1	Y	10 days 1/ 10 br
13 14	Life cycle age / stage of test organis Length and/or weight	1	Ť	12 days, +/- 12 hr N/A
15	Sex	1		Not reported, but can assume female.
16	Number of organisms per replicate	1	Y	Acute: 10 per replicate
17	Organism loading rate	1	N	
18	Food type and feeding periods during the acclimation period	1	Y	Suspension of powdered dried grass, trout-fry granules and Lake Superior water
	Test design / condition	1	T	
19	Test type (acute or chronic	n/a		Acute
20	Experiment type (laboratory or field	n/a		Lab
21	Exposure pathways (food, water, both)	n/a		Water
22	Exposure duration	n/a		Acute: 48 hr
23	Negative or positive controls (specify)	1	Y	Negative control
24 25	Number of replicates (including controls) Nominal concentrations reported?	1	N N	Acute: two
26	Measured concentrations reported?	3	N	
27	Food type and feeding periods during the long-term tests	1	Y	Suspension of powdered dried grass, trout-fry granules and Lake Superior water (for acute experiment "with food")

28	Were concentrations measured periodically (especially in the chronic test)?	1	N	Did not state frequency of measurments, however, authors followed procedures outlined by the APHA et al., 1960.
29	Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature)	3	Y	Temperature: 18 +/- 1, pH: 7.74, Hardness: 45,300 ug/L, Alkalinity: 42,300 ug/L, Dissolved oxygen: ~9 mg/L
30	Photoperiod and light intensity	1	Υ	16 hr photoperiod, ~115 ft-c
31	Stock and test solution preparation	1	Υ	Reagent grade salts, prepared with lake water
32	Was solubilizer/emulsifier used, if the chemical was poorly soluble or unstable?	1		N/A
33	If solubilizer/emulsifier was used, was its concentration reported?	1		N/A
34	If solubilizer/emulsifier was used, was its ecotoxicity reported?	1		N/A
35	Analytical monitoring intervals	1	N	
36	Statistical methods used	1	Υ	Reference: Litchfield and Wilcoxon (1949)
	Information relevant to the da	ta quality	/	
37	Was the endpoint directly caused by the chemical's toxicity, not by organism's health (e.g. when mortality in the control >10%) or physical effects (e.g. 'shading effect')?	n/a	N	Did not report control organism health/response
38	Was the test organism relevant to the Canadian environment?	3	Υ	
39	Were the test conditions (pH, temperature, DO, etc.) typical for the test organism?	1	Υ	
40	Does system type and design (static, semi-static, flow-through; sealed or open; etc.) correspond to the substance's properties and organism's nature/habits?	2	Υ	
41	Was pH of the test water within the range typical for the Canadian environment (6 to 9)?	1	Υ	7.4-8.2
42	Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)?	1	Υ	18 +/- 1
43	Was toxicity value below the chemical's water solubility?	3	Y	
	Results	l		
				48hr LC50: 1.11 mg
44	Toxicity values (specify endpoint and value)	n/a	n/a	total Co/L without food, 1.62 mg total Co/L with food

45	Other endpoints reported - e.g. BCF/BAF, LOEC/NOEC (specify)?	n/a	N		
46	Other adverse effects (e.g. carcinogenicity, mutagenicity) reported?	n/a	N		
47	Score: %	72.5			
48	EC Reliability code:	2			
49	Reliability category (high, satisfactory, low):	Satisfactory Confidence			
50	Comments	Tested total of 21 compounds. For all metals tested, acute metian lethal concentrations were higher with than without food.			

	Robust Study Summaries Fo	rm: Aq	uatic i	Γ
No	Item	Weight	Yes/No	Specify
1	Reference: Toxicity of sixty-three metals and metalloids thardness. Borgmann U., Couillard, Y., Doyle, P., and Go Toxicology and Chemistry. 24(3): 614-652			
2	Substance identity: CAS RN	n/a		7440484
3	Substance identity: chemical name(s)	n/a		Cobalt
4	Chemical composition of the substance	2	Y	1 g cobalt/L of standard. Standard was 2% HNO3
5	Chemical purity	1	Y	Atomic Absorption standards containing 1g metal/I
6	Persistence/stability of test substance in aquatic solution reported?	1		N/A
	Method			
7	Reference	1	N	
8	OECD, EU, national, or other standard method?	3	N	
9	Justification of the method/protocol if not a standard method was used	2	Υ	Authors modified method to allow for a much larger number of metals to be tested within a shorter period of time
10	GLP (Good Laboratory Practice)	3	N	
	Test organism			
11	Organism identity: name	n/a		Hyalella azteca
12	Latin or both Latin & common names reported?	1	Υ	
13	Life cycle age / stage of test organis	1	Υ	1-11 days old
14	Length and/or weight	1	N	
15	Sex	1		N/A (juvenile)
16	Number of organisms per replicate	1	Y	15
17	Organism loading rate	1	N	
18	Food type and feeding periods during the acclimation period	1	N	
	Test design / condition	ns		
19	Test type (acute or chronic	n/a		Acute
20	Experiment type (laboratory or field	n/a		Lab
21	Exposure pathways (food, water, both)	n/a		Water
22	Exposure duration	n/a		7 days
23	Negative or positive controls (specify)	1	Υ	Negative
24	Number of replicates (including controls)	1	Y	1 replicate for metal, 3 replicates for controls
25	Nominal concentrations reported?	1	Υ	10, 32, 100 ug/L
26	Measured concentrations reported?	3	Υ	
27	Food type and feeding periods during the long-term tests	1	Y	Fed at initiation and midweek with Tetra-Min

47	Score: %			77.3
46	Other adverse effects (e.g. carcinogenicity, mutagenicity) reported?	n/a	N	
45	Other endpoints reported - e.g. BCF/BAF, LOEC/NOEC (specify)?	n/a	N	
44	Toxicity values (specify endpoint and value)	n/a	n/a	7 day LC50 in ug Co/L with 95%CL: Soft water 16 (11 - 23); Tap water LC50: 89 (75-106)
	Results			
43	Was toxicity value below the chemical's water solubility?	3	Υ	
42	Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)?	1	Υ	24-25
41	Was pH of the test water within the range typical for the Canadian environment (6 to 9)?	1	Υ	Tap water: 8.39 (8.09 - 8.84); Soft Water 7.37 (6.79 - 7.84)
40	Does system type and design (static, semi-static, flow-through; sealed or open; etc.) correspond to the substance's properties and organism's nature/habits?	2	Y	
39	Were the test conditions (pH, temperature, DO, etc.) typical for the test organism?	1	Υ	
38	Was the test organism relevant to the Canadian environment?	3	Y	
37	Was the endpoint directly caused by the chemical's toxicity, not by organism's health (e.g. when mortality in the control >10%) or physical effects (e.g. 'shading effect')?	n/a	Y	Only data with control survival >80% was used.
	Information relevant to the da	ta quality	/	1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
36	Statistical methods used	1	Υ	Trimmed Spearman-Karber
35	Analytical monitoring intervals	1	Υ	
34	If solubilizer/emulsifier was used, was its ecotoxicity reported?	1		N/A
33	If solubilizer/emulsifier was used, was its concentration reported?	1		N/A
32	Was solubilizer/emulsifier used, if the chemical was poorly soluble or unstable?	1		N/A
31	Stock and test solution preparation	1	Υ	
30	Photoperiod and light intensity	1	Υ	16:8 photoperiod
29	Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature)	3	Υ	pH:8.09-8.84 , Conductivity: 311 (288-345), Temperature: 24- 25, oxygen concentrations:7- 10mg/L, Hardness: 124mg/L.
28	Were concentrations measured periodically (especially in the chronic test)?	1	Υ	

48	EC Reliability code:	2
49	Reliability category (high, satisfactory, low):	Satisfactory Confidence
50	Comments	Study examined 63 metals and metalloids to Hyalella azteca. The number of concentrations tested was reduced from the a typical logarithmic series (10, 18, 32, 56, 100) to 10, 32, 100.

	Robust Study Summaries For	rm: Aq	uatic i1	
No	Item	Weight	Yes/No	Specify
1	Reference: Aquatic toxicity of forty industrial chemicals: to substance spill prevention regulation. Cutis, M.W. and W 51: 359-367			
2	Substance identity: CAS RN	n/a		544183
3	Substance identity: chemical name(s)	n/a		Cobaltous formate
4	Chemical composition of the substance	2	Υ	
5	Chemical purity	1	N	
6	Persistence/stability of test substance in aquatic solution reported?	1		N/A
	Method			
7	Reference	1	N	
8	OECD, EU, national, or other standard method?	3	N	
9	Justification of the method/protocol if not a standard method was used	2	Y	
10	GLP (Good Laboratory Practice)	3		N/A
	Test organism			
11	Organism identity: name	n/a		Fathead minnow (Pimephales promelas)
12	Latin or both Latin & common names reported?	1	Υ	
13	Life cycle age / stage of test organis	1	N	
14	Length and/or weight	1	N	
15	Sex	1	N	
16	Number of organisms per replicate	1	Y	Five organisms per replicate
17	Organism loading rate	1	N	
18	Food type and feeding periods during the acclimation period	1	N	
	Test design / condition	ns		
19	Test type (acute or chronic)	n/a		Acute
20	Experiment type (laboratory or field)	n/a		Lab
21	Exposure pathways (food, water, both)	n/a		Water
22	Exposure duration	n/a		96hr
23	Negative or positive controls (specify)	1	Υ	Negative
24	Number of replicates (including controls)	1	Y	2
25	Nominal concentrations reported?	1	N	
26	Measured concentrations reported?	3	N	
27	Food type and feeding periods during the long-term tests	1		N/A
28	Were concentrations measured periodically (especially in the chronic test)?	1	Υ	
29	Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature)	3	Y	Temperature: 22 +/- 1 C, pH: 7.2-7.9, Conductivity: 120- 160 uS/cm, Hardness: 40-48 mg/L, Alkalinity: 30- 35 mg/L

30	Photoperiod and light intensity	1	N	
31	Stock and test solution preparation	1	N	
32	Was solubilizer/emulsifier used, if the chemical was poorly soluble or unstable?	1		N/A
33	If solubilizer/emulsifier was used, was its concentration reported?	1		N/A
34	If solubilizer/emulsifier was used, was its ecotoxicity reported?	1		N/A
35	Analytical monitoring intervals	1	Υ	
36	Statistical methods used	1	Υ	
	Information relevant to the da	ta quality	/	
37	Was the endpoint directly caused by the chemical's toxicity, not by organism's health (e.g. when mortality in the control >10%) or physical effects (e.g. 'shading effect')?	n/a	Y	Control mortality was <10%
38	Was the test organism relevant to the Canadian environment?	3	Y	
39	Were the test conditions (pH, temperature, DO, etc.) typical for the test organism?	1	Y	
40	Does system type and design (static, semi-static, flow-through; sealed or open; etc.) correspond to the substance's properties and organism's nature/habits?	2	Y	
41	Was pH of the test water within the range typical for the Canadian environment (6 to 9)?	1	Υ	7.2-7.9
42	Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)?	1	Y	22 +/- 1
43	Was toxicity value below the chemical's water solubility?	3	Y	
	Results			
44	Toxicity values (specify endpoint and value)	n/a	n/a	Endpoint in mg Co/L with 95%CL 96hr LC50: 12.7 (9.5-17.4)
45	Other endpoints reported - e.g. BCF/BAF, LOEC/NOEC (specify)?	n/a	N	
46	Other adverse effects (e.g. carcinogenicity, mutagenicity) reported?	n/a	N	
47	Score: %			61.0
48	EC Reliability code:			2
49	Reliability category (high, satisfactory, low):	S	atisfacto	ry Confidence

50	Comments	Endpoint reported in mg/L of parent compound (Cobaltous formate): 32.2 (24.0-44.1). Authors tested a total of 40 compounds. Concentrations of toxicants were measured (twice), however, were not reported in the paper. Cobaltous formate could be used as a surrogate substance for estimating the toxicity of dissolved cobalt since it is a soluble salt which readily dissociates into formate and Co2+. The formate has a significantly lower toxicity
		cobalt since it is a soluble salt which readily dissociates into formate and Co2+. The formate has

	Robust Study Summaries Fo	rm: Aq	uatic i	Robust Study Summaries Form: Aquatic iT				
No	Item	Weight	Yes/No	Specify				
1	Reference: Individual and interactive lethal toxicity of cad cobalt chloride to fish, worm and plankton. Das, B.K., and							
2	Substance identity: CAS RN	n/a		7646799				
3	Substance identity: chemical name(s)	n/a		Cobalt chloride (CoCl2)				
4	Chemical composition of the substance	2	Υ					
5	Chemical purity	1	Υ	Analytical grade.				
6	Persistence/stability of test substance in aquatic solution reported?	1		N/A				
	Method							
7	Reference	1	Υ	APHA 1975.				
8	OECD, EU, national, or other standard method?	3	Υ					
9	Justification of the method/protocol if not a standard method was used	2		N/A				
10	GLP (Good Laboratory Practice)	3		N/A				
	Test organism	1	T	T				
11	Organism identity: name	n/a		Cyprinus carpio				
12	Latin or both Latin & common names reported?	1	Y	-				
13	Life cycle age / stage of test organism	1	Y	Fry				
14	Length and/or weight	1	Υ	L: 3.0 +/- 0.29 cm, W:0.30g				
15	Sex	1	N					
16	Number of organisms per replicate	1	Υ	2				
17	Organism loading rate	1	Y	Indirectly. 10L of water, 0.3 g/fish, 10 fish per tank. Therefore 0.3g/L				
18	Food type and feeding periods during the acclimation period	1	N					
	Test design / condition	ns	•					
19	Test type (acute or chronic	n/a		Acute				
20	Experiment type (laboratory or field	n/a		Lab				
21	Exposure pathways (food, water, both)	n/a		Water				
22	Exposure duration	n/a		96hr				
23	Negative or positive controls (specify)	1	Y	Negative				
24	Number of replicates (including controls)	1	Y	5				
25	Nominal concentrations reported?	1	N					
26	Measured concentrations reported?	3	N					
27	Food type and feeding periods during the long-term tests	1		N/A				
28	Were concentrations measured periodically (especially in the chronic test)?	1	N					
29	Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature)	3	N	Not reported.				
30	Photoperiod and light intensity	1	N					
31	Stock and test solution preparation	1	N					

50	Comments	Endpoint reported as parent compound (mg/L CoCl2): 332.98 (326.00-340.10). Data from tests on teleost fish (Heteropneustes fossilis), was not significant, therefore and LC50 was not calculated.		
49	Reliability category (high, satisfactory, low):	S	atisfacto	ory Confidence
48	EC Reliability code:	2		
47	Score: %			61.5
46	Other adverse effects (e.g. carcinogenicity, mutagenicity) reported?	n/a	N	
45	Other endpoints reported - e.g. BCF/BAF, LOEC/NOEC (specify)?	n/a	N	
44	Toxicity values (specify endpoint and value)	n/a n/a with t		Enpoint in mg Co /L with 95%CL: 96hr LC50: 151.28 (147.96-154.36)
+3	solubility?	٥	· ·	
42	typical for the Canadian environment (5 to 27°C)? Was toxicity value below the chemical's water	3	N Y	reported.
41	Was pH of the test water within the range typical for the Canadian environment (6 to 9)? Was temperature of the test water within the range	1	N	Don't know, not reported. Don't know, not
40	Does system type and design (static, semi-static, flow-through; sealed or open; etc.) correspond to the substance's properties and organism's nature/habits?	2	Y	
39	Were the test conditions (pH, temperature, DO, etc.) typical for the test organism?	1	Υ	
38	Was the test organism relevant to the Canadian environment?	3	Υ	
37	Was the endpoint directly caused by the chemical's toxicity, not by organism's health (e.g. when mortality in the control >10%) or physical effects (e.g. 'shading effect')?	n/a	Y	No control mortality
	Information relevant to the da	ta quality	/	The state of the s
36	Statistical methods used	1	Y	Probit Analysis
34	reported? Analytical monitoring intervals	1	N	N/A
33	If solubilizer/emulsifier was used, was its concentration reported? If solubilizer/emulsifier was used, was its ecotoxicity	1		N/A
32	Was solubilizer/emulsifier used, if the chemical was poorly soluble or unstable?	1		N/A

	Robust Study Summaries Form: Aquatic iT					
No	Item	Weight	Yes/No	Specify		
1	Reference: Simultaneous evalutation of the acute effects Ewell, W.S., Gorsuch, J.W., Kringle, R.O., Robillard, K.A. Environmental Toxicology and Chemistry. 5: 831-840					
2	Substance identity: CAS RN	n/a		7646799		
3	Substance identity: chemical name(s)	n/a		Cobalt chloride		
4	Chemical composition of the substance	2	Υ			
5	Chemical purity	1	Υ	Reagent grade		
6	Persistence/stability of test substance in aquatic solution reported?	1		N/A		
	Method					
7	Reference	1	N			
8	OECD, EU, national, or other standard method?	3	N			
9	Justification of the method/protocol if not a standard method was used	2	Y			
10	GLP (Good Laboratory Practice)	3		N/A		
	Test organism	<u>I</u>	<u>I</u>			
11	Organism identity: name	n/a		Pimephales promelas		
12	Latin or both Latin & common names reported?	1	Υ			
13	Life cycle age / stage of test organism	1	Υ	Juvenile		
14	Length and/or weight	1	Υ	0.2-0.5g		
15	Sex	1		N/A (juvenile)		
16	Number of organisms per replicate	1	Υ	10		
17	Organism loading rate	1	N			
18	Food type and feeding periods during the acclimation period	1	N			
	Test design / condition	าร	<u>I</u>			
19	Test type (acute or chronic	n/a		Acute		
20	Experiment type (laboratory or field	n/a		Lab		
21	Exposure pathways (food, water, both)	n/a		Water		
22	Exposure duration	n/a		96 h		
23	Negative or positive controls (specify)	1	Υ	Negative		
24	Number of replicates (including controls)	1	N			
25	Nominal concentrations reported?	1	Y	4 (0.1, 1, 10, 100 mg/L)		
26	Measured concentrations reported?	3	N			
27	Food type and feeding periods during the long-term tests	1		N/A		
28	Were concentrations measured periodically (especially in the chronic test)?	1	N			
29	Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature)	3	Y	Temperature: 20 +/- 1 C, pH: 6.8-8.5, Harndess: 130mg/L, Alkalinity: 93 mg/L		
-00	Photoperiod and light intensity	1	Υ	16L:8D, 50 ft-c		
30	i notoponou una ligiti intonotty					

	Man policialismos/amoutation constitution in the			
32	Was solubilizer/emulsifier used, if the chemical was poorly soluble or unstable?	1		N/A
33	If solubilizer/emulsifier was used, was its concentration reported?	1		N/A
34	If solubilizer/emulsifier was used, was its ecotoxicity reported?	1		N/A
35	Analytical monitoring intervals	1	Υ	
36	Statistical methods used	1	Υ	
	Information relevant to the da	ta quality	/	
37	Was the endpoint directly caused by the chemical's toxicity, not by organism's health (e.g. when mortality in the control >10%) or physical effects (e.g. 'shading effect')?	n/a	N	Control organism health/response was not reported
38	Was the test organism relevant to the Canadian environment?	3	Y	
39	Were the test conditions (pH, temperature, DO, etc.) typical for the test organism?	1	Υ	
40	Does system type and design (static, semi-static, flow-through; sealed or open; etc.) correspond to the substance's properties and organism's nature/habits?	2	Υ	
41	Was pH of the test water within the range typical for the Canadian environment (6 to 9)?	1	Y	6.5-8.5
42	Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)?	1	Υ	20 +/- 1
43	Was toxicity value below the chemical's water solubility?	3	Y	
	Results			
44	Toxicity values (specify endpoint and value)	n/a	n/a	96 hr LC50: 22 mg Co /L
45	Other endpoints reported - e.g. BCF/BAF, LOEC/NOEC (specify)?	n/a	N	
46	Other adverse effects (e.g. carcinogenicity, mutagenicity) reported?	n/a	N	
47	Score: %			72.5
48	EC Reliability code:			2
49	Reliability category (high, satisfactory, low):	S	atisfacto	ory Confidence
50	Comments	Endpoint reported as mg Cobalt chloride/L (corrected here to Co). Authors were testing a method for multispecies testing. The authors placed the test organisms in the same test container (test concentration), with the minnows and snails in the test vessels, and the other five species (water flea, flaworm, sidwimmer, pillbug, segemented worm) in separate baskets that were suspended into		

	Robust Study Summaries Form: Aquatic iT					
No	Item	Weight	Yes/No	Specify		
1	Reference: Relationship between heavy metal accumulate (L.) Schleid. and <i>Azolla pinnata</i> R.Br. Gaur, J.P., Noraho, Botany.49: 183-192.					
2	Substance identity: CAS RN	n/a		7646799		
3	Substance identity: chemical name(s)	n/a		Cobalt chloride		
4	Chemical composition of the substance	2	Υ			
5	Chemical purity	1	Υ	Analytical-grade		
6	Persistence/stability of test substance in aquatic solution reported?	1		N/A		
	Method					
7	Reference	1	Υ	Wang, 1990		
8	OECD, EU, national, or other standard method?	3	N			
9	Justification of the method/protocol if not a standard method was used	2	Υ			
10	GLP (Good Laboratory Practice)	3		N/A		
	Test organism					
11	Organism identity: name	n/a		Azolla pinnata R.Br.		
12	Latin or both Latin & common names reported?	1	Υ			
13	Life cycle age / stage of test organism	1		N/A		
14	Length and/or weight	1	N			
15	Sex	1		N/A		
16	Number of organisms per replicate	1	Y	10		
17	Organism loading rate	1	N			
18	Food type and feeding periods during the acclimation period	1		N/A		
	Test design / condition	าร				
19	Test type (acute or chronic	n/a		Acute		
20	Experiment type (laboratory or field	n/a		Lab		
21	Exposure pathways (food, water, both)	n/a		Water		
22	Exposure duration	n/a		4 days		
23	Negative or positive controls (specify)	1	Y	Negative		
24	Number of replicates (including controls)	1	Y	5		
25	Nominal concentrations reported?	1	Y	5 (0.85, 1.7, 8.5, 17.0, 85.0 uM)		
26	Measured concentrations reported?	3	N			
27	Food type and feeding periods during the long-term tests	1		N/A		
28	Were concentrations measured periodically (especially in the chronic test)?	1	N			
29	Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature)	3	N	Only temperature and pH were reported		
30	Photoperiod and light intensity	1	Υ	14L:10D, 45 umol/m^2/s		
31	Stock and test solution preparation	1	Υ			
32	Was solubilizer/emulsifier used, if the chemical was poorly soluble or unstable?	1		N/A		

33	If solubilizer/emulsifier was used, was its concentration reported?	1		N/A
34	If solubilizer/emulsifier was used, was its ecotoxicity reported?	1		N/A
35	Analytical monitoring intervals	1	N	
36	Statistical methods used	1	Υ	
	Information relevant to the da	ta quality	,	
37	Was the endpoint directly caused by the chemical's toxicity, not by organism's health (e.g. when mortality in the control >10%) or physical effects (e.g. 'shading effect')?	n/a	Υ	
38	Was the test organism relevant to the Canadian environment?	3	Υ	
39	Were the test conditions (pH, temperature, DO, etc.) typical for the test organism?	1	Υ	
40	Does system type and design (static, semi-static, flow-through; sealed or open; etc.) correspond to the substance's properties and organism's nature/habits?	2	Υ	
41	Was pH of the test water within the range typical for the Canadian environment (6 to 9)?	1	Υ	7
42	Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)?	1	Y	25+/- 1
43	Was toxicity value below the chemical's water solubility?	3	Y	
	Results			
44	Toxicity values (specify endpoint and value)	n/a	n/a	4 day EC50(growth rate): 4.1+/- 0.1 (SD) uM Co = 0.24 mg/L
45	Other endpoints reported - e.g. BCF/BAF, LOEC/NOEC (specify)?	n/a		
46	Other adverse effects (e.g. carcinogenicity, mutagenicity) reported?	n/a		
47	Score: %	65.8		
48	EC Reliability code: 2			2
49	Reliability category (high, satisfactory, low):	Satisfactory Confidence		
50	Comments	The order of toxicity (of metals tested) was Cd>Cr>Co>Cu>Ni>Pb>Zn for this species.		

	Robust Study Summaries Form and In	nstruct	ions: A	quatic iT
No	Item	Weight	Yes/No	Specify
1	Reference: Toxicity of metals to a freshwater tubificid wo B.S., 1991. Bulletin of Environmental Contamination and			
2	Substance identity: CAS RN	n/a		7646799
3	Substance identity: chemical name(s)	n/a		Cobalt chloride CoCl2*6H20
4	Chemical composition of the substance	2	Υ	
5	Chemical purity	1	Υ	Reagent grade
6	Persistence/stability of test substance in aquatic solution reported?	1		N/A
	Method			
7	Reference	1	Υ	APHA et al., 1981
8	OECD, EU, national, or other standard method?	3	Υ	APHA et al., 1981
9	Justification of the method/protocol if not a standard method was used	2		N/A
10	GLP (Good Laboratory Practice)	3		N/A
	Test organism	•	•	
11	Organism identity: name	n/a		Tubifex tubifex (Muller)
12	Latin or both Latin & common names reported?	1	Υ	
13	Life cycle age / stage of test organis	1	N	
14	Length and/or weight	1	N	
15	Sex	1		N/A
16	Number of organisms per replicate	1	Υ	10
17	Organism loading rate	1	N	
18	Food type and feeding periods during the acclimation period	1	N	
	Test design / condition	ns		
19	Test type (acute or chronic	n/a		Acute
20	Experiment type (laboratory or field	n/a		Lab
21	Exposure pathways (food, water, both)	n/a		Water
22	Exposure duration	n/a		96hr
23	Negative or positive controls (specify)	1	Υ	Negative
24	Number of replicates (including controls)	1	Υ	3
25	Nominal concentrations reported?	1	N	
26	Measured concentrations reported?	3	N	
27	Food type and feeding periods during the long-term tests	1	N	
28	Were concentrations measured periodically (especially in the chronic test)?	1	N	
29	Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature)	3	Y	Temperature: 30 (29.5-31) C., pH: 7.6 (7.5-7.7), Dissolved oxygen: 5.8 (5.2-6.0) mg/L, Hardness: 245 (230-250) mg/L CaCO3, Alkalinity: 400 (390-410) mg/L CaCO3)

30	Photoperiod and light intensity	1	N	
31	Stock and test solution preparation	1	Υ	With deionized water
32	Was solubilizer/emulsifier used, if the chemical was poorly soluble or unstable?	1		N/A
33	If solubilizer/emulsifier was used, was its concentration reported?	1		N/A
34	If solubilizer/emulsifier was used, was its ecotoxicity reported?	1		N/A
35	Analytical monitoring intervals	1	Υ	
36	Statistical methods used	1	Υ	
	Information relevant to the da	ta quality	/	
37	Was the endpoint directly caused by the chemical's toxicity, not by organism's health (e.g. when mortality in the control >10%) or physical effects (e.g. 'shading effect')?	n/a	Υ	
38	Was the test organism relevant to the Canadian environment?	3	Υ	
39	Were the test conditions (pH, temperature, DO, etc.) typical for the test organism?	1	Y	
40	Does system type and design (static, semi-static, flow-through; sealed or open; etc.) correspond to the substance's properties and organism's nature/habits?	2	Y	
41	Was pH of the test water within the range typical for the Canadian environment (6 to 9)?	1	Y	7.6 (7.5-7.7)
42	Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)?	1	N	30 (29.5-31)
43	Was toxicity value below the chemical's water solubility?	3	Υ	
	Results			
44	Toxicity values (specify endpoint and value)	n/a	n/a	96hr EC50 (immobility): 139.32 (113.14-148.79) mg Co/L with 95% CL
45	Other endpoints reported - e.g. BCF/BAF, LOEC/NOEC (specify)?	n/a	N	
46	Other adverse effects (e.g. carcinogenicity, mutagenicity) reported?	n/a	N	
47	Score: %	69.2		
48	EC Reliability code:	2		
49	Reliability category (high, satisfactory, low):	Satisfactory Confidence		
50	Comments	The authors suggest that toxicity is related to a metal's strength of covalent binding to an ionogenic group.		

	Robust Study Summaries Fo	rm: Aq	uatic i1	Г			
No	Item	Weight	Yes/No	Specify			
1	Reference: Investigation of correlation between physiochemical properties of metals and their toxicity to the water flea <i>Daphnia magna</i> Straus. Khangarot, B.S, and Ray, P.K. 1989. Ecotoxicology and Environmental Safety 18: 109-120						
2	Substance identity: CAS RN	n/a		7646799			
3	Substance identity: chemical name(s)	n/a		Cobalt chloride (CoCl2*6H20)			
4	Chemical composition of the substance	2	Υ				
5	Chemical purity	1	Υ	Reagent grade			
6	Persistence/stability of test substance in aquatic solution reported?	1		N/A			
	Method						
7	Reference	1	N				
8	OECD, EU, national, or other standard method?	3	Ν				
9	Justification of the method/protocol if not a standard method was used	2	Υ				
10	GLP (Good Laboratory Practice)	3		N/A			
	Test organism						
11	Organism identity: name	n/a		Daphnia magna			
12	Latin or both Latin & common names reported?	1	Υ				
13	Life cycle age / stage of test organis	1	N				
14	Length and/or weight	1		N/A			
15	Sex	1		Can be assumed as female.			
16	Number of organisms per replicate	1	Y	10			
17	Organism loading rate	1	N				
18	Food type and feeding periods during the acclimation period	1	Y	Fed dry fish food and yeast			
	Test design / conditio	ns		,			
19	Test type (acute or chronic	n/a		Acute			
20	Experiment type (laboratory or field	n/a		Lab			
21	Exposure pathways (food, water, both)	n/a		Water			
22	Exposure duration	n/a		48hr			
23	Negative or positive controls (specify)	1	Υ	Negative			
24	Number of replicates (including controls)	1	Υ	3 replicates			
25	Nominal concentrations reported?	1	Ν				
26	Measured concentrations reported?	3	N				
27	Food type and feeding periods during the long-term tests	1		N/A			
28	Were concentrations measured periodically (especially in the chronic test)?	1	N				

29	Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature)	3	Y	Temperature: 13 (11.5-14.5)C, pH: 7.6 (7.2-7.8), Dissolved oxygen: 5.6 (5.2-6.5) mg/L, Hardness: 240 (235-260) CaCO3, Alkalinity: 400 (390- 415) mg/L CaCO3.
30	Photoperiod and light intensity	1	N	
31	Stock and test solution preparation	1	Υ	Prepared in distilled water
32	Was solubilizer/emulsifier used, if the chemical was poorly soluble or unstable?	1		N/A
33	If solubilizer/emulsifier was used, was its concentration reported?	1		N/A
34	If solubilizer/emulsifier was used, was its ecotoxicity reported?	1		N/A
35	Analytical monitoring intervals	1	Υ	
36	Statistical methods used	1	Υ	
	Information relevant to the da	ta quality	,	
37	Was the endpoint directly caused by the chemical's toxicity, not by organism's health (e.g. when mortality in the control >10%) or physical effects (e.g. 'shading effect')?	n/a	N	Did not report control organism health/reponse.
38	Was the test organism relevant to the Canadian environment?	3	Υ	
39	Were the test conditions (pH, temperature, DO, etc.) typical for the test organism?	1	Υ	
40	Does system type and design (static, semi-static, flow-through; sealed or open; etc.) correspond to the substance's properties and organism's nature/habits?	2	Y	
41	Was pH of the test water within the range typical for the Canadian environment (6 to 9)?	1	Υ	Mean: 7.6 (7.2-7.8)
42	Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)?	1	Υ	Mean: 13 (11.5-14.5
43	Was toxicity value below the chemical's water solubility?	3	Υ	
	Results			
44	Toxicity values (specify endpoint and value)	n/a	n/a	48hr EC50: 1.49 (1.27-2.48) mg Co/L
45	Other endpoints reported - e.g. BCF/BAF, LOEC/NOEC (specify)?	n/a	N	
46	Other adverse effects (e.g. carcinogenicity, mutagenicity) reported?	n/a	Ν	
47	Score: %			69.2
48	EC Reliability code:			2
49	Reliability category (high, satisfactory, low):	S	atisfacto	ory Confidence
	, , ,			

50	Comments	The authors suggest that physiochemical properties and toxicity are correlated and that they may be used to set up a mathematical model for predicting toxicity.
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	Robust Study Summaries For	rm: Aq	uatic i1	
No	Item	Weight	Yes/No	Specify
1	Reference: pH-dependent toxicity of heavy metals to a fr Muller. Khangarot, B.S., Rathore, R.S., Singh, B.B. 2003 Contamination and Toxicology. 71: 283-289.			
2	Substance identity: CAS RN	n/a		7646799
3	Substance identity: chemical name(s)	n/a		Cobalt Chloride (CoCl2 *6H20)
4	Chemical composition of the substance	2	Υ	
5	Chemical purity	1	Y	Reagent grade
6	Persistence/stability of test substance in aquatic solution reported?	1		N/A
	Method		T	
7	Reference	1	Y	APHA et al., 1993
8	OECD, EU, national, or other standard method?	3	Y	APHA et al., 1993
9	Justification of the method/protocol if not a standard method was used	2		N/A
10	GLP (Good Laboratory Practice)	3	N	
	Test organism	1	T	
11	Organism identity: name	n/a		Tubifex tubifex Muller
12	Latin or both Latin & common names reported?	1	Υ	
13	Life cycle age / stage of test organis	1	N	
14	Length and/or weight	1	N	
15	Sex	1		N/A
16	Number of organisms per replicate	1	Y	10
17	Organism loading rate	1	N	
18	Food type and feeding periods during the acclimation period	1	N	
	Test design / condition	ns	T	
19	Test type (acute or chronic	n/a		Acute
20	Experiment type (laboratory or field	n/a		Lab
21	Exposure pathways (food, water, both)	n/a		Water
22	Exposure duration	n/a		96hr
23	Negative or positive controls (specify)	1	Y	Negative
24	Number of replicates (including controls)	1	Y	2 or 3
25 26	Nominal concentrations reported? Measured concentrations reported?	3	N N	
27	Food type and feeding periods during the long-term	1	N	Not mentionned
28	Were concentrations measured periodically (especially	1	N	
29	were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature)	3	Y	Temperature: 20 +/- 1 C, pH: 6.0 (6.0- 6.3), Hardness: 305 mg/L CaCO3, Alkalinity: 225 mg/L CaCO3.
30	Photoperiod and light intensity	1	Y	12L:12D

		1		
31	Stock and test solution preparation	1	Υ	Reagent grade salts prepared in double-glass distilled water
32	Was solubilizer/emulsifier used, if the chemical was poorly soluble or unstable?	1		N/A
33	If solubilizer/emulsifier was used, was its concentration reported?	1		N/A
34	If solubilizer/emulsifier was used, was its ecotoxicity reported?	1		N/A
35	Analytical monitoring intervals	1	N	
36	Statistical methods used	1	Υ	moving-average- angle method
	Information relevant to the da	ta quality	,	
37	Was the endpoint directly caused by the chemical's toxicity, not by organism's health (e.g. when mortality in the control >10%) or physical effects (e.g. 'shading effect')?	n/a	Y	All control test organisms survived
38	Was the test organism relevant to the Canadian environment?	3	Υ	
39	Were the test conditions (pH, temperature, DO, etc.) typical for the test organism?	1	Υ	
40	Does system type and design (static, semi-static, flow-through; sealed or open; etc.) correspond to the substance's properties and organism's nature/habits?	2	Y	
41	Was pH of the test water within the range typical for the Canadian environment (6 to 9)?	1	Υ	6.0-6.3
42	Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)?	1	Υ	20
43	Was toxicity value below the chemical's water solubility?	3	Υ	
	Results			
44	Toxicity values (specify endpoint and value)	n/a	n/a	96hr LC50 at pH 6: 156.6 (109.4-212.1) mg Co/L with 95%CL
45	Other endpoints reported - e.g. BCF/BAF, LOEC/NOEC (specify)?	n/a	N	
46	Other adverse effects (e.g. carcinogenicity, mutagenicity) reported?	n/a	Z	
47	Score: %	% 66.7		
48	EC Reliability code:			2
49	Reliability category (high, satisfactory, low):	Satisfactory Confidence		
50	Comments	The authors concluded that slight difference in experimental conditions, especially pH, result in changes in EC50 values that make direct comparisons of relative acute sensitivites impractical.		

	Robust Study Summaries Form: Aquatic iT					
No	Item	Weight	Yes/No	Specify		
Reference: pH-dependent toxicity of heavy metals to a freshwater sludgeworm <i>Tubifex tubifex</i> Muller. Khangarot, B.S., Rathore, R.S., Singh, B.B. 2003. Bulletin of Environmental Contamination and Toxicology. 71: 283-289.						
2	Substance identity: CAS RN	n/a		7646799		
3	Substance identity: chemical name(s)	n/a		Cobalt Chloride (CoCl2 *6H20)		
4	Chemical composition of the substance	2	Υ			
5	Chemical purity	1	Y	Reagent grade		
6	Persistence/stability of test substance in aquatic solution reported?	1		N/A		
	Method	T				
7	Reference	1	Υ	APHA et al., 1993		
8	OECD, EU, national, or other standard method?	3	Y	APHA et al., 1993		
9	Justification of the method/protocol if not a standard method was used	2		N/A		
10	GLP (Good Laboratory Practice)	3	N			
	Test organism					
11	Organism identity: name	n/a		Tubifex tubifex Muller		
12	Latin or both Latin & common names reported?	1	Υ			
13	Life cycle age / stage of test organis	1	N			
14	Length and/or weight	1	N			
15	Sex	1		N/A		
16	Number of organisms per replicate	1	Y	10		
17	Organism loading rate	1	N			
18	Food type and feeding periods during the acclimation period	1	N			
	Test design / condition	1		I -		
19	Test type (acute or chronic	n/a		Acute		
20	Experiment type (laboratory or field	n/a		Lab		
21	Exposure pathways (food, water, both)	n/a		Water		
22	Exposure duration	n/a 1	Y	96hr		
24	Negative or positive controls (specify) Number of replicates (including controls)	1	Y	Negative 2 or 3		
25	Nominal concentrations reported?	1	N	2 01 3		
26	Measured concentrations reported?	3	N			
27	Food type and feeding periods during the long-term tests	1	N	Not mentioned		
28	Were concentrations measured periodically (especially in the chronic test)?	1	N			
29	Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature)	3	Y	Temperature: 20 +/- 1 C, pH: 7.0 (7.0- 7.3), Hardness: 305 mg/L CaCO3, Alkalinity: 225 mg/L CaCO3.		
30	Photoperiod and light intensity	1	Υ	12L:12D		

		•		
31	Stock and test solution preparation	1	Y	Reagent grade salts prepared in double- glass distilled water
32	Was solubilizer/emulsifier used, if the chemical was poorly soluble or unstable?	1		N/A
33	If solubilizer/emulsifier was used, was its concentration reported?	1		N/A
34	If solubilizer/emulsifier was used, was its ecotoxicity reported?	1		N/A
35	Analytical monitoring intervals	1	N	
36	Statistical methods used	1	Υ	moving-average- angle method
	Information relevant to the da	ta quality	/	
37	Was the endpoint directly caused by the chemical's toxicity, not by organism's health (e.g. when mortality in the control >10%) or physical effects (e.g. 'shading effect')?	n/a	Y	All control test organisms survived
38	Was the test organism relevant to the Canadian environment?	3	Υ	
39	Were the test conditions (pH, temperature, DO, etc.) typical for the test organism?	1	Υ	
40	Does system type and design (static, semi-static, flow-through; sealed or open; etc.) correspond to the substance's properties and organism's nature/habits?	2	Y	
41	Was pH of the test water within the range typical for the Canadian environment (6 to 9)?	1	Υ	6.0-6.3, 7.0-7.3, 8.0-8.3
42	Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)?	1	Y	20
43	Was toxicity value below the chemical's water solubility?	3	Υ	
	Results			1
44	Toxicity values (specify endpoint and value)	n/a	n/a	96hr LC50 at pH 7: 203.1(169.3-237.1) mg Co/L with 95%CL
45	Other endpoints reported - e.g. BCF/BAF, LOEC/NOEC (specify)?	n/a	N	
46	Other adverse effects (e.g. carcinogenicity, mutagenicity) reported?	n/a	N	
47	Score: %			66.7
48	EC Reliability code:			2
49	Reliability category (high, satisfactory, low): Satisfactory Confidence			ry Confidence
50	Comments	The authors concluded that slight difference in experimental conditions, especially pH, result in changes in EC50 values that make direct comparisons of relative acute sensitivites impractical.		
	· · · · · · · · · · · · · · · · · · ·			

	Robust Study Summaries For	rm: Aq	uatic i	Γ			
No	Item	Weight	Yes/No	Specify			
1	Reference: pH-dependent toxicity of heavy metals to a freshwater sludgeworm <i>Tubifex tubifex</i> Muller. Khangarot, B.S., Rathore, R.S., Singh, B.B. 2003. Bulletin of Environmental Contamination and Toxicology. 71: 283-289.						
2	Substance identity: CAS RN	n/a		7646799			
3	Substance identity: chemical name(s)	n/a		Cobalt Chloride (CoCl2 *6H20)			
4	Chemical composition of the substance	2	Y				
5	Chemical purity	1	Y	Reagent grade			
6	Persistence/stability of test substance in aquatic solution reported?	1		N/A			
	Method						
7	Reference	1	Υ	APHA et al., 1993			
8	OECD, EU, national, or other standard method?	3	Y	APHA et al., 1993			
9	Justification of the method/protocol if not a standard method was used	2		N/A			
10	GLP (Good Laboratory Practice)	3	N				
	Test organism	1					
11	Organism identity: name	n/a		Tubifex tubifex Muller			
12	Latin or both Latin & common names reported?	1	Υ				
13	Life cycle age / stage of test organis	1	N				
14	Length and/or weight	1	N				
15	Sex	1	.,	N/A			
16	Number of organisms per replicate	1	Y	10			
17	Organism loading rate Food type and feeding periods during the acclimation period	1	N N				
	Test design / condition	ns					
19	Test type (acute or chronic	n/a		Acute			
20	Experiment type (laboratory or field	n/a		Lab			
21	Exposure pathways (food, water, both)	n/a		Water			
22	Exposure duration	n/a		96hr			
23	Negative or positive controls (specify)	1	Υ	Negative			
24	Number of replicates (including controls)	1	Υ	2 or 3			
25	Nominal concentrations reported?	1	N				
26	Measured concentrations reported?	3	N				
27	Food type and feeding periods during the long-term tests	1	N	not mentioned			
28	Were concentrations measured periodically (especially in the chronic test)?	1	N				
29	Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature)	3	Y	Temperature: 20 +/-1 C, pH: 8.0 (8.0-8.3), Hardness: 305 mg/L CaCO3, Alkalinity: 225 mg/L CaCO3.			
30	Photoperiod and light intensity	1	Υ	12L:12D			

31	Stock and test solution preparation	1	Y	Reagent grade salts prepared in double- glass distilled water
32	Was solubilizer/emulsifier used, if the chemical was poorly soluble or unstable?	1		N/A
33	If solubilizer/emulsifier was used, was its concentration reported?	1		N/A
34	If solubilizer/emulsifier was used, was its ecotoxicity reported?	1		N/A
35	Analytical monitoring intervals	1	N	
36	Statistical methods used	1	Υ	moving-average- angle method
	Information relevant to the da	ta quality	/	
37	Was the endpoint directly caused by the chemical's toxicity, not by organism's health (e.g. when mortality in the control >10%) or physical effects (e.g. 'shading effect')?	n/a	Υ	All control test organisms survived
38	Was the test organism relevant to the Canadian environment?	3	Υ	
39	Were the test conditions (pH, temperature, DO, etc.) typical for the test organism?	1	Υ	
40	Does system type and design (static, semi-static, flow-through; sealed or open; etc.) correspond to the substance's properties and organism's nature/habits?	2	Y	
41	Was pH of the test water within the range typical for the Canadian environment (6 to 9)?	1	Υ	6.0-6.3, 7.0-7.3, 8.0-8.3
42	Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)?	1	Υ	20
43	Was toxicity value below the chemical's water solubility?	3	Y	
	Results		r	
44	Toxicity values (specify endpoint and value)	n/a	n/a	96hr LC50 at pH 8: 585.8(479.9-653.5) mg Co/L with 95%CL
45	Other endpoints reported - e.g. BCF/BAF, LOEC/NOEC (specify)?	n/a	N	
46	Other adverse effects (e.g. carcinogenicity, mutagenicity) reported?	n/a	N	
47	Score: %			66.7
48	EC Reliability code:			2
49	Reliability category (high, satisfactory, low):	Satisfactory Confidence		
50	Comments	The authors concluded that slight difference in experimental conditions, especially pH, result in changes in EC50 values that make direct comparisons of relative acute sensitivites impractical.		

	Robust Study Summaries Form: Aquatic iT					
No	Item	Weight	Yes/No	Specify		
1	Reference:The effects of lesser known metals and one o promelas) and Daphnia magna. Kimball, G.L. 1978. Departments.					
2	Substance identity: CAS RN	n/a		10393494		
3	Substance identity: chemical name(s)	n/a		Cobalt sulphate		
4	Chemical composition of the substance	2	Y			
5	Chemical purity	1	Υ	Reagent grade		
6	Persistence/stability of test substance in aquatic solution reported?	1		N/A		
	Method					
7	Reference	1	N			
8	OECD, EU, national, or other standard method?	3	N			
9	Justification of the method/protocol if not a standard method was used	2	Y			
10	GLP (Good Laboratory Practice)	3		N/A		
	Test organism					
11	Organism identity: name	n/a		Pimphales promelas		
12	Latin or both Latin & common names reported?	1	Υ			
13	Life cycle age / stage of test organism	1	Y	8-week old juveniles		
14	Length and/or weight	1	Y	12-16mm		
15	Sex	1		N/A		
16	Number of organisms per replicate	1	Υ	10		
17	Organism loading rate	1	N			
18	Food type and feeding periods during the acclimation period	1	N			
	Test design / condition	าร				
19	Test type (acute or chronic	n/a		Acute		
20	Experiment type (laboratory or field	n/a		Lab		
21	Exposure pathways (food, water, both)	n/a		Water		
22	Exposure duration	n/a		8 days		
23	Negative or positive controls (specify)	1	Y	Negative		
24	Number of replicates (including controls)	1	Y	2		
25	Nominal concentrations reported?	1	N			
26	Measured concentrations reported?	3	N			
27	Food type and feeding periods during the long-term tests	1	Y			
28	Were concentrations measured periodically (especially in the chronic test)?	1	Y			
29	Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature)	3	Y	Temperature: 25.4 C, pH: 8.16, Dissolved oxygen: 7.02 mg/L, Alkalinity: 235 mg.L.		
30	Photoperiod and light intensity	1	N			
31	Stock and test solution preparation	1	Υ			

32	Was solubilizer/emulsifier used, if the chemical was poorly soluble or unstable?	1		N/A
33	If solubilizer/emulsifier was used, was its concentration reported?	1		N/A
34	If solubilizer/emulsifier was used, was its ecotoxicity reported?	1		N/A
35	Analytical monitoring intervals	1	Υ	
36	Statistical methods used	1	Υ	
	Information relevant to the da	ta quality	/	
37	Was the endpoint directly caused by the chemical's toxicity, not by organism's health (e.g. when mortality in the control >10%) or physical effects (e.g. 'shading effect')?	n/a	N	Did not report control organisms health/reponse
38	Was the test organism relevant to the Canadian environment?	3	Υ	
39	Were the test conditions (pH, temperature, DO, etc.) typical for the test organism?	1	Υ	
40	Does system type and design (static, semi-static, flow-through; sealed or open; etc.) correspond to the substance's properties and organism's nature/habits?	2	Υ	
41	Was pH of the test water within the range typical for the Canadian environment (6 to 9)?	1	Υ	Mean 8.16
42	Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)?	1	Υ	Mean 25.4
43	Was toxicity value below the chemical's water solubility?	3	Υ	
	Results			
44	Toxicity values (specify endpoint and value)	n/a	n/a	96 hr LC50: 3.75, 3.46 mgCo/L 192 hr LC50: 2.76, 2.72 mgCo/L
45	Other endpoints reported - e.g. BCF/BAF, LOEC/NOEC (specify)?	n/a		
46	Other adverse effects (e.g. carcinogenicity, mutagenicity) reported?	n/a		
47	Score: %			73.2
48	EC Reliability code:			2
49	Reliability category (high, satisfactory, low):	S	atisfacto	ry Confidence
50	Comments	The 96 hr and 192 hr LC50 values were similar for antimony and manganese, however sensitivity for other metals (including Co) was higher at 192 hours.		

	Robust Study Summaries For	rm: Aq	uatic i	r
No	Item	Weight	Yes/No	Specify
1	Reference:The effects of lesser known metals and one of promelas) and Daphnia magna. Kimball, G.L. 1978. Departing Wildlife, University of Minnesota.			
2	Substance identity: CAS RN	n/a		10393494
3	Substance identity: chemical name(s)	n/a		Cobalt sulphate
4	Chemical composition of the substance	2	Y	
5	Chemical purity	1	Υ	Reagent grade
6	Persistence/stability of test substance in aquatic solution reported?	1		N/A
	Method			
7	Reference	1	N	
8	OECD, EU, national, or other standard method?	3	N	
9	Justification of the method/protocol if not a standard method was used	2	Y	
10	GLP (Good Laboratory Practice)	3		N/A
	Test organism	1 .	T	
11	Organism identity: name	n/a		Daphnia magna
12	Latin or both Latin & common names reported?	1	Y	40 / 40
13	Life cycle age / stage of test organism	1	Y	12 +/- 12 hours old
14	Length and/or weight	1		N/A
15	Sex	1		Assume to be female.
16	Number of organisms per replicate	1	Y	10
17	Organism loading rate	1	N	
18	Food type and feeding periods during the acclimation period	1	N	
	Test design / condition	าร		
19	Test type (acute or chronic	n/a		Acute
20	Experiment type (laboratory or field	n/a		Lab
21	Exposure pathways (food, water, both)	n/a		Water
22	Exposure duration	n/a		48 hr
23	Negative or positive controls (specify)	1	Y	Negative
24	Number of replicates (including controls)	1	Y	2
25	Nominal concentrations reported?	1	N	
26	Measured concentrations reported?	3	N	
27	Food type and feeding periods during the long-term tests	1		N/A
28	Were concentrations measured periodically (especially in the chronic test)?	1	Y	
29	Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature)	3	Y	Temperature: 20.4 C, pH: 7.93, Dissolved oxygen: 7.93 mg/L, Alkalinity: 234 mg/L
30	Photoperiod and light intensity	1	N	
31	Stock and test solution preparation	1	Υ	

32	Was solubilizer/emulsifier used, if the chemical was poorly soluble or unstable?	1		N/A
33	If solubilizer/emulsifier was used, was its concentration reported?	1		N/A
34	If solubilizer/emulsifier was used, was its ecotoxicity reported?	1		N/A
35	Analytical monitoring intervals	1	Υ	
36	Statistical methods used	1	Υ	
	Information relevant to the da	ta quality	/	
37	Was the endpoint directly caused by the chemical's toxicity, not by organism's health (e.g. when mortality in the control >10%) or physical effects (e.g. 'shading effect')?	n/a	N	Did not report control organisms health/reponse
38	Was the test organism relevant to the Canadian environment?	3	Y	
39	Were the test conditions (pH, temperature, DO, etc.) typical for the test organism?	1	Y	
40	Does system type and design (static, semi-static, flow-through; sealed or open; etc.) correspond to the substance's properties and organism's nature/habits?	2	Υ	
41	Was pH of the test water within the range typical for the Canadian environment (6 to 9)?	1	Y	Mean: 8.35
42	Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)?	1	Υ	Mean: 20.4
43	Was toxicity value below the chemical's water solubility?	3	Υ	
	Results	1	T	
44	Toxicity values (specify endpoint and value)	n/a	n/a	48 hr LC50: 6.83, 5.15 mg/L
45	Other endpoints reported - e.g. BCF/BAF, LOEC/NOEC (specify)?	n/a	N	
46	Other adverse effects (e.g. carcinogenicity, mutagenicity) reported?	n/a	N	
47	Score: %			71.8
48	EC Reliability code:			2
49	Reliability category (high, satisfactory, low):	S	atisfacto	ory Confidence
50	Comments	Not fed. The presence or absence of food did not significantly effect the toxicity of thallium, selenium, vanadium and aluminum. The presence did however, affect all other metals tested. For cobalt, the presence of food increased the LC50 value.		

	Robust Study Summaries For	rm: Aq	uatic i	Γ
No	Item	Weight	Yes/No	Specify
1	Reference:The effects of lesser known metals and one of promelas) and Daphnia magna. Kimball, G.L. 1978. Departments. University of Minnesota.			
2	Substance identity: CAS RN	n/a		10393494
3	Substance identity: chemical name(s)	n/a		Cobalt sulphate
4	Chemical composition of the substance	2	Υ	
5	Chemical purity	1	Y	Reagent grade
6	Persistence/stability of test substance in aquatic solution reported?	1		N/A
	Method	<u>I</u>	<u>I</u>	<u> </u>
7	Reference	1	N	
8	OECD, EU, national, or other standard method?	3	N	
9	Justification of the method/protocol if not a standard method was used	2	Υ	
10	GLP (Good Laboratory Practice)	3		N/A
	Test organism			1.4
11	Organism identity: name	n/a		Daphnia magna
12	Latin or both Latin & common names reported?	1	Y	Dapinia magna
13	Life cycle age / stage of test organism	1	Y	12 +/- 12 hours old
14	Length and/or weight	1		N/A
15	Sex	1		Assume to be female.
16	Number of organisms per replicate	1	Υ	10
17	Organism loading rate	1	N	
18	Food type and feeding periods during the acclimation period	1	N	
	Test design / condition	าร	<u>I</u>	
19	Test type (acute or chronic	n/a		Acute
20	Experiment type (laboratory or field	n/a		Lab
21	Exposure pathways (food, water, both)	n/a		Water
22	Exposure duration	n/a		96 hr
23	Negative or positive controls (specify)	1	Υ	Negative
24	Number of replicates (including controls)	1	Υ	2
25	Nominal concentrations reported?	1	N	
26	Measured concentrations reported?	3	N	
27	Food type and feeding periods during the long-term tests	1	Y	
28	Were concentrations measured periodically (especially in the chronic test)?	1	Υ	
29	Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature)	3	Y	Temperature: 20.4 C, pH: 7.93, Dissolved oxygen: 7.93 mg/L, Alkalinity: 234 mg/L
30	Photoperiod and light intensity	1	N	
31	Stock and test solution preparation	1	Υ	
32	Was solubilizer/emulsifier used, if the chemical was poorly soluble or unstable?	1		N/A

50	Comments	Fed. The presence or absence of food did not significantly effect the toxicity of thallium, selenium, vanadium and aluminum. The presence did however, affect all other metals tested. For cobalt, the presence of food increased the LC50 value.		
49	Reliability category (high, satisfactory, low):	S	atisfacto	ry Confidence
48	EC Reliability code:			2
47	Score: %			72.5
46	Other adverse effects (e.g. carcinogenicity, mutagenicity) reported?	n/a	N	
45	Other endpoints reported - e.g. BCF/BAF, LOEC/NOEC (specify)?	n/a	N	
44	Toxicity values (specify endpoint and value)	n/a	n/a	48 hr LC50: 7.37 mg/L, 96 hr LC50: 1.86 mg/L
	Results			
43	Was toxicity value below the chemical's water solubility?	3	Υ	
42	Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)?	1	Υ	Mean: 20.4
41	Was pH of the test water within the range typical for the Canadian environment (6 to 9)?	1	Y	Mean: 8.35
40	Does system type and design (static, semi-static, flow-through; sealed or open; etc.) correspond to the substance's properties and organism's nature/habits?	2	Y	
39	Were the test conditions (pH, temperature, DO, etc.) typical for the test organism?	1	Y	
38	Was the test organism relevant to the Canadian environment?	3	Υ	
37	Was the endpoint directly caused by the chemical's toxicity, not by organism's health (e.g. when mortality in the control >10%) or physical effects (e.g. 'shading effect')?	n/a	N	Did not report control organisms health/reponse
	Information relevant to the da	ta quality	/	
36	Statistical methods used	1	Y	
34	reported? Analytical monitoring intervals	1	Y	N/A
33	If solubilizer/emulsifier was used, was its concentration reported? If solubilizer/emulsifier was used, was its ecotoxicity	1		N/A

	Robust Study Summaries Fo	rm: Aq	uatic i	Γ			
No	Item	Weight	Yes/No	Specify			
1	Reference: Toxicity of cobalt and copper to rainbow trout: application of a mechanistic model for predicting survival. Marr, J.C.A., Hansen, J.A., Meyer, J.S., Cacela, D., Podrabsky, T., Lipton J., and Bergman, H.L. 1998. Aquatic Toxicology 43: 225-238						
2	Substance identity: CAS RN	n/a		7646799			
3	Substance identity: chemical name(s)	n/a		Cobalt chloride (CoCl2*6H20)			
4	Chemical composition of the substance	2	Y				
5	Chemical purity	1	Y	Reagent grade metal salt			
6	Persistence/stability of test substance in aquatic solution reported?	1		N/A			
	Method						
7	Reference	1	Υ	Sprague 1969			
8	OECD, EU, national, or other standard method?	3	Ν				
9	Justification of the method/protocol if not a standard method was used	2	Υ				
10	GLP (Good Laboratory Practice)	3	N				
	Test organism						
11	Organism identity: name	n/a		Rainbow trout (Oncorhynchus mykiss)			
12	Latin or both Latin & common names reported?	1	Υ				
13	Life cycle age / stage of test organis	1	Υ				
14	Length and/or weight	1	Υ	Length: 29-32mm			
15	Sex	1	Ν				
16	Number of organisms per replicate	1	Υ	5			
17	Organism loading rate	1	Y	Less than 1.5g fish/L			
18	Food type and feeding periods during the acclimation period	1	Y				
	Test design / condition	ทร					
19	Test type (acute or chronic	n/a	Υ	Acute			
20	Experiment type (laboratory or field	n/a	Υ	Lab			
21	Exposure pathways (food, water, both)	n/a	Υ	Water			
22	Exposure duration	n/a	Y	14 days, but LC50/LC20 calculated at 96 and 144 hrs			
23	Negative or positive controls (specify)	1	Υ	Negative control			
24	Number of replicates (including controls)	1	Υ	6			
25	Nominal concentrations reported?	1	Υ	0, 125, 250, 500, 1000, 2000			
26	Measured concentrations reported?	3	Υ				
27	Food type and feeding periods during the long-term tests	1	Y	No feeding 48 hr prior or during test			
28	Were concentrations measured periodically (especially in the chronic test)?	1	Y	Every three days			

48	EC Reliability code:			1
47	Score: %			84.4
46	Other adverse effects (e.g. carcinogenicity, mutagenicity) reported?	n/a	N	
45	Other endpoints reported - e.g. BCF/BAF, LOEC/NOEC (specify)?	n/a	N	
44	Toxicity values (specify endpoint and value)	n/a	n/a	Endpoint with 95% CL in ug Co/L: 144hr LC50: 520(286-945) 144 hr LC20: 228(99- 522)
	Results	T		
43	Was toxicity value below the chemical's water solubility?	3	Y	
42	Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)?	1	Y	10
41	Was pH of the test water within the range typical for the Canadian environment (6 to 9)?	1	Y	7.51 (SD:0.11)
40	Does system type and design (static, semi-static, flow-through; sealed or open; etc.) correspond to the substance's properties and organism's nature/habits?	2	Υ	
39	Were the test conditions (pH, temperature, DO, etc.) typical for the test organism?	1	Y	
38	Was the test organism relevant to the Canadian environment?	3	Υ	
37	Was the endpoint directly caused by the chemical's toxicity, not by organism's health (e.g. when mortality in the control >10%) or physical effects (e.g. 'shading effect')?	n/a	Y	
00	Information relevant to the da		I	Propiriographic
35 36	Analytical monitoring intervals Statistical methods used	1	Y	Every three days probit regression
34	If solubilizer/emulsifier was used, was its ecotoxicity reported? Applytical monitoring intervals	1	V	N/A
33	If solubilizer/emulsifier was used, was its concentration reported?	1		N/A
32	Was solubilizer/emulsifier used, if the chemical was poorly soluble or unstable?	1		N/A
31	Stock and test solution preparation	1	Υ	Salts dissolved in deionized water
30	Photoperiod and light intensity	1	Υ	12-hr light/dark cycle
29	Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature)	3	Y	Temperature: 9.9 (SD: 0.3) C, pH: 7.51 (SD: 0.1), Dissolved oxygen: 8.5 (0.2) mg/L, Hardness: 24.9 (SD: 0.7) mg/L CaCO3, Alkalinity: 24.9 (3.6 SD) mg/L CaCO3
				1

49	Reliability category (high, satisfactory, low):	High Confidence
50	Comments	Tested Co-only, Cu-only, and two levels of Co+Cu. The authors noted a temporal pattern of Co toxicity and as a result, suggested that 96 hr acute toxicity tests with rainbow trout substantially underpredict Co toxicity.

	Robust Study Summaries Fo	rm: Aq	uatic i	Γ
No	Item	Weight	Yes/No	Specify
1	Reference:The acute lethal toxicity of heavy metals to pereference to fresh-water asellids and gammarids). Martin Research 20 (9): 1137-1147			
2	Substance identity: CAS RN	n/a		7646799
3	Substance identity: chemical name(s)	n/a		Cobalt chloride (CoCl2*6H20)
4	Chemical composition of the substance	2	Υ	
5	Chemical purity	1	Υ	Analar grade
6	Persistence/stability of test substance in aquatic solution reported?	1		N/A
	Method			
7	Reference	1	N	
8	OECD, EU, national, or other standard method?	3	N	
9	Justification of the method/protocol if not a standard method was used	2	Υ	
10	GLP (Good Laboratory Practice)	3		N/A
	Test organism			
11	Organism identity: name	n/a		Crangonyx pseudogracilis
12	Latin or both Latin & common names reported?	1	Υ	
13	Life cycle age / stage of test organis	1	Υ	
14	Length and/or weight	1	Y	Mean 4mm, approx. 0.2 mg dry wt
15	Sex	1	N	
16	Number of organisms per replicate	1	Υ	20-30
17	Organism loading rate	1	N	
18	Food type and feeding periods during the acclimation period	1	Y	
	Test design / condition	ns		
19	Test type (acute or chronic	n/a		Acute
20	Experiment type (laboratory or field	n/a		Lab
21	Exposure pathways (food, water, both)	n/a		Water
22	Exposure duration	n/a		96hr
23	Negative or positive controls (specify)	1	Y	Negative control
24	Number of replicates (including controls)	1	Y	2
25	Nominal concentrations reported?	1	N	
26	Measured concentrations reported?	3	N	
27	Food type and feeding periods during the long-term tests	1		N/A
28	Were concentrations measured periodically (especially in the chronic test)?	1	N	

49	Reliability category (high, satisfactory, low):	S	atisfacto	ory Confidence
48	EC Reliability code:			2
47	Score: %			63.4
46	Other adverse effects (e.g. carcinogenicity, mutagenicity) reported?	n/a	N	
45	Other endpoints reported - e.g. BCF/BAF, LOEC/NOEC (specify)?	n/a	N	
44	Toxicity values (specify endpoint and value)	n/a	n/a	96h LC50 with 95% CL: 39.2 (35.3-43.3) ppm Cobalt.
	Results			•
43	Was toxicity value below the chemical's water solubility?	3	Υ	
42	Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)?	1	Υ	13
41	Was pH of the test water within the range typical for the Canadian environment (6 to 9)?	1	Y	6.7-6.8
40	Does system type and design (static, semi-static, flow-through; sealed or open; etc.) correspond to the substance's properties and organism's nature/habits?	2	Y	
39	Were the test conditions (pH, temperature, DO, etc.) typical for the test organism?	1	Y	
38	Was the test organism relevant to the Canadian environment?	3	N	Introduced species
37	Was the endpoint directly caused by the chemical's toxicity, not by organism's health (e.g. when mortality in the control >10%) or physical effects (e.g. 'shading effect')?	n/a	N	Did not report control organism health/response.
	Information relevant to the da	ta quality	/	
36	Statistical methods used	1	Y	
35	Analytical monitoring intervals	1	N	
34	If solubilizer/emulsifier was used, was its ecotoxicity reported?	1		N/A
33	If solubilizer/emulsifier was used, was its concentration reported?	1		N/A
32	Was solubilizer/emulsifier used, if the chemical was poorly soluble or unstable?	1		N/A
31	Stock and test solution preparation	1	Υ	Salt dissolved in deionized water
30	Photoperiod and light intensity	1	Υ	12h light:dark cycle
29	Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature)	3	Y	Temperature: 13 C, pH: 6.7-6.8, Dissolved oxygen: 9.6 mg/L, Conductivity: 300-350 uS/cm, Hardness: 50 (45-55) mg CaCO3/L, Alkalinity: 40-60 mg CaCO3/L.
		I		

50	Comments	Authors also tested several other compounds (18) on the amphipod. The authors also exposed Asellus aquaticus to different metals, but not cobalt.
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	Robust Study Summaries Fo	rm: Aq	uatic i1	Г
No	Item	Weight	Yes/No	Specify
1	Reference:Effects of temperature on the sensitivity of slu selected heavy metals. Rathore, R., and Khangarot, B. 2 Safety 53: 27-36			
2	Substance identity: CAS RN	n/a		7646799
3	Substance identity: chemical name(s)	n/a		Cobalt chloride CoCl2*6H20
4	Chemical composition of the substance	2	Υ	
5	Chemical purity	1	Υ	Reagent grade
6	Persistence/stability of test substance in aquatic solution reported?	1		N/A
	Method			
7	Reference	1	Υ	APHA et al., 1989
8	OECD, EU, national, or other standard method?	3	Υ	APHA et al., 1989
9	Justification of the method/protocol if not a standard method was used	2		N/A
10	GLP (Good Laboratory Practice)	3	N	
	Test organism			
11	Organism identity: name	n/a		Sludge Worm (Tubifex tubifex)
12	Latin or both Latin & common names reported?	1	Υ	
13	Life cycle age / stage of test organis	1	Ν	
14	Length and/or weight	1	Ν	
15	Sex	1		N/A
16	Number of organisms per replicate	1	Ν	
17	Organism loading rate	1	Ν	
18	Food type and feeding periods during the acclimation period	1	N	
	Test design / condition	ns		
19	Test type (acute or chronic	n/a		Acute
20	Experiment type (laboratory or field	n/a		Lab
21	Exposure pathways (food, water, both)	n/a		Water
22	Exposure duration	n/a		96 hr
23	Negative or positive controls (specify)	1	Υ	Negative
24	Number of replicates (including controls)	1	Υ	2 (duplicate)
25	Nominal concentrations reported?	1	Y	56, 100, 180, 320, 560, 1000 mg/L
26	Measured concentrations reported?	3	N	
27	Food type and feeding periods during the long-term tests	1		No feeding
28	Were concentrations measured periodically (especially in the chronic test)?	1	N	

29	Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature)	3	Υ	Temperature: 15 +/- 1, pH: 7.3-7.8, Dissolved oxygen: 5.7 (5.1-5.6) mg/L, Conductivity: 950 (800-1000) uM/cm, Hardness: 237 (226-255) mg/L, Alkalinity: 380 9360- 415) mg/L
30	Photoperiod and light intensity	1	Υ	12L:12D
31	Stock and test solution preparation	1	Y	Salts were prepared in double-glass distilled water
32	Was solubilizer/emulsifier used, if the chemical was poorly soluble or unstable?	1		N/A
33	If solubilizer/emulsifier was used, was its concentration reported?	1		N/A
34	If solubilizer/emulsifier was used, was its ecotoxicity reported?	1		N/A
35	Analytical monitoring intervals	1	N	
36	Statistical methods used	1	Y	Used the moving- average-angle method (Harris, 1959)
	Information relevant to the da	ta quality	/	•
37	Was the endpoint directly caused by the chemical's toxicity, not by organism's health (e.g. when mortality in the control >10%) or physical effects (e.g. 'shading effect')?	n/a	Y	%Mortality in all controls was 0.
38	Was the test organism relevant to the Canadian environment?	3	Υ	
39	Were the test conditions (pH, temperature, DO, etc.) typical for the test organism?	1	Υ	except for various temperatures tested
40	Does system type and design (static, semi-static, flow-through; sealed or open; etc.) correspond to the substance's properties and organism's nature/habits?	2	Y	
41	Was pH of the test water within the range typical for the Canadian environment (6 to 9)?	1	Υ	7.3-7.8
42	Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)?	1	Υ	15+/- 1
43	Was toxicity value below the chemical's water solubility?	3	Υ	
	Results			
44	Toxicity values (specify endpoint and value)	n/a	n/a	96-h EC50 with 95%CL :239.39 (204.02-362.73) mg Co/L
45	Other endpoints reported - e.g. BCF/BAF, LOEC/NOEC (specify)?	n/a	N	

46	Other adverse effects (e.g. carcinogenicity, mutagenicity) reported?	n/a	N	The sludge worms had characteristic behavioral changes when exposed to various concentrations of heavy metals.
47	Score: %			68.3
48	EC Reliability code:			2
49	Reliability category (high, satisfactory, low):	S	atisfact	ory Confidence
50	Comments	observe tempera	ed that a ature ca rity to he	ested, the authors in increase in used an increase in eavy metals (with the n).

	Robust Study Summaries Fo	rm: Aq	uatic i1	Γ
No	Item	Weight	Yes/No	Specify
1	Reference: Effects of temperature on the sensitivity of sluselected heavy metals. Rathore, R., and Khangarot, B. 2 Safety 53: 27-36			
2	Substance identity: CAS RN	n/a		7646799
3	Substance identity: chemical name(s)	n/a		Cobalt chloride CoCl2*6H20
4	Chemical composition of the substance	2	Υ	
5	Chemical purity	1	Υ	Reagent grade
6	Persistence/stability of test substance in aquatic solution reported?	1		N/A
	Method			
7	Reference	1	Υ	APHA et al., 1989
8	OECD, EU, national, or other standard method?	3	Υ	APHA et al., 1989
9	Justification of the method/protocol if not a standard method was used	2		N/A
10	GLP (Good Laboratory Practice)	3	N	
	Test organism			
11	Organism identity: name	n/a		Sludge Worm (Tubifex tubifex)
12	Latin or both Latin & common names reported?	1	Υ	
13	Life cycle age / stage of test organis	1	Ν	
14	Length and/or weight	1	Ν	
15	Sex	1		N/A
16	Number of organisms per replicate	1	Ν	
17	Organism loading rate	1	Ν	
18	Food type and feeding periods during the acclimation period	1	N	
	Test design / condition	ns		
19	Test type (acute or chronic	n/a		Acute
20	Experiment type (laboratory or field	n/a		Lab
21	Exposure pathways (food, water, both)	n/a		Water
22	Exposure duration	n/a		96 hr
23	Negative or positive controls (specify)	1	Υ	Negative
24	Number of replicates (including controls)	1	Υ	2 (duplicate)
25	Nominal concentrations reported?	1	Υ	56, 100, 180, 320, 560, 1000 mg/L
26	Measured concentrations reported?	3	N	
27	Food type and feeding periods during the long-term tests	1		No feeding
28	Were concentrations measured periodically (especially in the chronic test)?	1	N	

29	Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature)	3	Y	Temperature: 20 +/- 1, pH: 7.3-7.8, Dissolved oxygen: 5.7 (5.1-5.6) mg/L, Conductivity: 950 (800-1000) uM/cm, Hardness: 237 (226-255) mg/L, Alkalinity: 380 9360- 415) mg/L
30	Photoperiod and light intensity	1	Υ	12L:12D
31	Stock and test solution preparation	1	Y	Salts were prepared in double-glass distilled water
32	Was solubilizer/emulsifier used, if the chemical was poorly soluble or unstable?	1		N/A
33	If solubilizer/emulsifier was used, was its concentration reported?	1		N/A
34	If solubilizer/emulsifier was used, was its ecotoxicity reported?	1		N/A
35	Analytical monitoring intervals	1	N	
36	Statistical methods used	1	Y	Used the moving- average-angle method (Harris, 1959)
	Information relevant to the da	ta quality	/	
37	Was the endpoint directly caused by the chemical's toxicity, not by organism's health (e.g. when mortality in the control >10%) or physical effects (e.g. 'shading effect')?	n/a	Y	%Mortality in all controls was 0.
38	Was the test organism relevant to the Canadian environment?	3	Υ	
39	Were the test conditions (pH, temperature, DO, etc.) typical for the test organism?	1	Υ	except for various temperatures tested
40	Does system type and design (static, semi-static, flow-through; sealed or open; etc.) correspond to the substance's properties and organism's nature/habits?	2	Y	
41	Was pH of the test water within the range typical for the Canadian environment (6 to 9)?	1	Υ	7.3-7.8
42	Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)?	1	Y	20+/- 1
43	Was toxicity value below the chemical's water solubility?	3	Υ	
	Results			
44	Toxicity values (specify endpoint and value)	n/a	n/a	96-hEC50 with 95%CL:179.71 (152.76-220.16) mg Co/L
45	Other endpoints reported - e.g. BCF/BAF, LOEC/NOEC (specify)?	n/a	N	

50	Comments	observe tempera	ed that a ature ca rity to he	ested, the authors an increase in used an increase in eavy metals (with the n).
49	Reliability category (high, satisfactory, low):	S	atisfact	ory Confidence
48	EC Reliability code:			2
47	Score: %			68.3
46	Other adverse effects (e.g. carcinogenicity, mutagenicity) reported?	n/a	N	The sludge worms had characteristic behavioral changes when exposed to various concentrations of heavy metals.

	Robust Study Summaries Fo	rm: Aq	uatic i	Γ
No	Item	Weight	Yes/No	Specify
1	Reference:Effects of temperature on the sensitivity of slu selected heavy metals. Rathore, R., and Khangarot, B. 2 Safety 53: 27-36			
2	Substance identity: CAS RN	n/a		7646799
3	Substance identity: chemical name(s)	n/a		Cobalt chloride CoCl2*6H20
4	Chemical composition of the substance	2	Υ	
5	Chemical purity	1	Υ	Reagent grade
6	Persistence/stability of test substance in aquatic solution reported?	1		
	Method			
7	Reference	1	Υ	APHA et al., 1989
8	OECD, EU, national, or other standard method?	3	Υ	APHA et al., 1989
9	Justification of the method/protocol if not a standard method was used	2		N/A
10	GLP (Good Laboratory Practice)	3	N	
	Test organism			
11	Organism identity: name	n/a		Sludge Worm (Tubifex tubifex)
12	Latin or both Latin & common names reported?	1	Υ	
13	Life cycle age / stage of test organis	1	Ν	
14	Length and/or weight	1	Ν	
15	Sex	1		
16	Number of organisms per replicate	1	N	
17	Organism loading rate	1	N	
18	Food type and feeding periods during the acclimation period	1	N	
	Test design / condition	ns		
19	Test type (acute or chronic	n/a		Acute
20	Experiment type (laboratory or field	n/a		Lab
21	Exposure pathways (food, water, both)	n/a		Water
22	Exposure duration	n/a		96 hr
23	Negative or positive controls (specify)	1	Υ	Negative
24	Number of replicates (including controls)	1	Υ	2 (duplicate)
25	Nominal concentrations reported?	1	Υ	56, 100, 180, 320, 560, 1000 mg/L
26	Measured concentrations reported?	3	N	-
27	Food type and feeding periods during the long-term tests	1		No feeding
28	Were concentrations measured periodically (especially in the chronic test)?	1	N	

29	Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature)	3	Y	Temperature: 25 +/- 1, pH: 7.3-7.8, Dissolved oxygen: 5.7 (5.1-5.6) mg/L, Conductivity: 950 (800-1000) uM/cm, Hardness: 237 (226-255) mg/L, Alkalinity: 380 9360- 415) mg/L
30	Photoperiod and light intensity	1	Υ	12L:12D
31	Stock and test solution preparation	1	Υ	Salts were prepared in double-glass distilled water
32	Was solubilizer/emulsifier used, if the chemical was poorly soluble or unstable?	1		N/A
33	If solubilizer/emulsifier was used, was its concentration reported?	1		N/A
34	If solubilizer/emulsifier was used, was its ecotoxicity reported?	1		N/A
35	Analytical monitoring intervals	1	N	
36	Statistical methods used	1	Y	Used the moving- average-angle method (Harris, 1959)
	Information relevant to the da	41:4-		
	momation relevant to the da	ta quanty	<i>'</i>	
37	Was the endpoint directly caused by the chemical's toxicity, not by organism's health (e.g. when mortality in the control >10%) or physical effects (e.g. 'shading effect')?	n/a	Y	%Mortality in all controls was 0.
37	Was the endpoint directly caused by the chemical's toxicity, not by organism's health (e.g. when mortality in the control >10%) or physical effects (e.g. 'shading			
	Was the endpoint directly caused by the chemical's toxicity, not by organism's health (e.g. when mortality in the control >10%) or physical effects (e.g. 'shading effect')? Was the test organism relevant to the Canadian	n/a	Υ	
38	Was the endpoint directly caused by the chemical's toxicity, not by organism's health (e.g. when mortality in the control >10%) or physical effects (e.g. 'shading effect')? Was the test organism relevant to the Canadian environment? Were the test conditions (pH, temperature, DO, etc.)	n/a 3	Y	controls was 0.
38	Was the endpoint directly caused by the chemical's toxicity, not by organism's health (e.g. when mortality in the control >10%) or physical effects (e.g. 'shading effect')? Was the test organism relevant to the Canadian environment? Were the test conditions (pH, temperature, DO, etc.) typical for the test organism? Does system type and design (static, semi-static, flow-through; sealed or open; etc.) correspond to the	n/a 3	Y Y Y	controls was 0.
38 39 40	Was the endpoint directly caused by the chemical's toxicity, not by organism's health (e.g. when mortality in the control >10%) or physical effects (e.g. 'shading effect')? Was the test organism relevant to the Canadian environment? Were the test conditions (pH, temperature, DO, etc.) typical for the test organism? Does system type and design (static, semi-static, flow-through; sealed or open; etc.) correspond to the substance's properties and organism's nature/habits? Was pH of the test water within the range typical for the Canadian environment (6 to 9)? Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)?	n/a 3 1	Y Y Y	except for various temperatures tested
38 39 40 41	Was the endpoint directly caused by the chemical's toxicity, not by organism's health (e.g. when mortality in the control >10%) or physical effects (e.g. 'shading effect')? Was the test organism relevant to the Canadian environment? Were the test conditions (pH, temperature, DO, etc.) typical for the test organism? Does system type and design (static, semi-static, flow-through; sealed or open; etc.) correspond to the substance's properties and organism's nature/habits? Was pH of the test water within the range typical for the Canadian environment (6 to 9)? Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)? Was toxicity value below the chemical's water solubility?	n/a 3 1 2	Y Y Y Y	except for various temperatures tested 7.3-7.8
38 39 40 41 42	Was the endpoint directly caused by the chemical's toxicity, not by organism's health (e.g. when mortality in the control >10%) or physical effects (e.g. 'shading effect')? Was the test organism relevant to the Canadian environment? Were the test conditions (pH, temperature, DO, etc.) typical for the test organism? Does system type and design (static, semi-static, flow-through; sealed or open; etc.) correspond to the substance's properties and organism's nature/habits? Was pH of the test water within the range typical for the Canadian environment (6 to 9)? Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)?	n/a 3 1 2 1	Y Y Y Y Y Y	except for various temperatures tested 7.3-7.8
38 39 40 41 42	Was the endpoint directly caused by the chemical's toxicity, not by organism's health (e.g. when mortality in the control >10%) or physical effects (e.g. 'shading effect')? Was the test organism relevant to the Canadian environment? Were the test conditions (pH, temperature, DO, etc.) typical for the test organism? Does system type and design (static, semi-static, flow-through; sealed or open; etc.) correspond to the substance's properties and organism's nature/habits? Was pH of the test water within the range typical for the Canadian environment (6 to 9)? Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)? Was toxicity value below the chemical's water solubility?	n/a 3 1 2 1	Y Y Y Y Y Y	except for various temperatures tested 7.3-7.8

46	Other adverse effects (e.g. carcinogenicity, mutagenicity) reported?	n/a	N	The sludge worms had characteristic behavioral changes when exposed to various concentrations of heavy metals.
47	Score: %			68.3
48	EC Reliability code:	2		
49	Reliability category (high, satisfactory, low):	Satisfactory Confidence		
50	Comments	Of the metals tested, the authors observed that an increase in temperature caused an increase in sensitivity to heavy metals (with the exception of Mn).		

	Robust Study Summaries Fo	rm: Aq	uatic i1	Γ	
No	Item	Weight	Yes/No	Specify	
1	Reference:Effects of temperature on the sensitivity of slu selected heavy metals. Rathore, R.S., and Khangarot, B Environmental Safety 53: 27-36				
2	Substance identity: CAS RN n/a 7646799		7646799		
3	Substance identity: chemical name(s)	n/a		Cobalt chloride CoCl2*6H20	
4	Chemical composition of the substance	2	Υ		
5	Chemical purity	1	Υ	Reagent grade	
6	Persistence/stability of test substance in aquatic solution reported?	1		N/A	
	Method				
7	Reference	1	Υ	APHA et al., 1989	
8	OECD, EU, national, or other standard method?	3	Υ	APHA et al., 1989	
9	Justification of the method/protocol if not a standard method was used	2		N/A	
10	GLP (Good Laboratory Practice)	3	N		
	Test organism				
11	Organism identity: name	n/a		Sludge Worm (Tubifex tubifex)	
12	Latin or both Latin & common names reported?	1	Υ		
13	Life cycle age / stage of test organis	1	N		
14	Length and/or weight	1 N			
15			N/A		
16	Number of organisms per replicate	1	N		
17	Organism loading rate	1	N		
18	Food type and feeding periods during the acclimation period	1	N		
	Test design / condition	ns			
19	Test type (acute or chronic	n/a		Acute	
20	Experiment type (laboratory or field	n/a		Lab	
21	Exposure pathways (food, water, both)	n/a		Water	
22	Exposure duration	n/a		96 hr	
23	Negative or positive controls (specify)	1	Υ	Negative	
24	Number of replicates (including controls)	1	1 Y 2 (duplicate)		
25	Nominal concentrations reported?	1	Υ	56, 100, 180, 320, 560, 1000 mg/L	
26	Measured concentrations reported?	3	N		
27	Food type and feeding periods during the long-term tests	1		No feeding	
28	Were concentrations measured periodically (especially in the chronic test)?	1	N		

29	Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature)		Υ	Temperature: 30 +/- 1, pH: 7.3-7.8, Dissolved oxygen: 5.7 (5.1-5.6) mg/L, Conductivity: 950 (800-1000) uM/cm, Hardness: 237 (226-255) mg/L, Alkalinity: 380 9360- 415) mg/L
30	Photoperiod and light intensity	1	Υ	12L:12D
31	Stock and test solution preparation	1	Y	Salts were prepared in double-glass distilled water
32	Was solubilizer/emulsifier used, if the chemical was poorly soluble or unstable?	1		N/A
33	If solubilizer/emulsifier was used, was its concentration reported?	1		N/A
34	If solubilizer/emulsifier was used, was its ecotoxicity reported?	1		N/A
35	Analytical monitoring intervals	1	N	
36	Statistical methods used		Y	Used the moving- average-angle method (Harris, 1959)
	Information relevant to the da	ta quality	/	
37	Was the endpoint directly caused by the chemical's toxicity, not by organism's health (e.g. when mortality in the control >10%) or physical effects (e.g. 'shading effect')?	n/a	Y	%Mortality in all controls was 0.
38	Was the test organism relevant to the Canadian environment?	3	Υ	
39	Were the test conditions (pH, temperature, DO, etc.) typical for the test organism?	1	Υ	except for various temperatures tested
40	Does system type and design (static, semi-static, flow-through; sealed or open; etc.) correspond to the substance's properties and organism's nature/habits?	2	Υ	
40	through; sealed or open; etc.) correspond to the	2	Y	7.3-7.8
	through; sealed or open; etc.) correspond to the substance's properties and organism's nature/habits? Was pH of the test water within the range typical for the			7.3-7.8 30 +/- 1
41	through; sealed or open; etc.) correspond to the substance's properties and organism's nature/habits? Was pH of the test water within the range typical for the Canadian environment (6 to 9)? Was temperature of the test water within the range	1	Y	
41 42	through; sealed or open; etc.) correspond to the substance's properties and organism's nature/habits? Was pH of the test water within the range typical for the Canadian environment (6 to 9)? Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)? Was toxicity value below the chemical's water	1	Y	
41 42	through; sealed or open; etc.) correspond to the substance's properties and organism's nature/habits? Was pH of the test water within the range typical for the Canadian environment (6 to 9)? Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)? Was toxicity value below the chemical's water solubility?	1	Y	

46	Other adverse effects (e.g. carcinogenicity, mutagenicity) reported?	n/a	N	The sludge worms had characteristic behavioral changes when exposed to various concentrations of heavy metals.
47	Score: %			68.3
48	EC Reliability code:			2
49	Reliability category (high, satisfactory, low):	Satisfactory Confidence		ory Confidence
50	Comments	Of the metals tested, the authors observed that an increase in temperature caused an increase in sensitivity to heavy metals (with the exception of Mn).		

	Robust Study Summaries Form: Aquatic iT				
No	Item	Weight	Yes/No	Specify	
Reference: Effects of water hardness and metal concentration on a freshwater <i>Tubifex tubife</i> Muller. Rathore, R.S., and Khangarot, B.S. 2003 Water, Air, and Soil Pollution 143: 341-356					
2	Substance identity: CAS RN	n/a		7646799	
3	Substance identity: chemical name(s)	n/a		Cobalt chloride CoCl2*6H20	
4	Chemical composition of the substance	2	Υ		
5	Chemical purity	1	Υ	Reagent grade	
6	Persistence/stability of test substance in aquatic solution reported?	1		N/A	
	Method				
7	Reference	1	Υ	APHA et al., 1989	
8	OECD, EU, national, or other standard method?	3	Υ	APHA et al., 1989	
9	Justification of the method/protocol if not a standard method was used	2		N/A	
10	GLP (Good Laboratory Practice)	3	N		
	Test organism				
11	Organism identity: name	n/a		Sludge worm (Tubifex tubifex)	
12	Latin or both Latin & common names reported?	1	Υ	Tubifex tubifex Muller	
13	Life cycle age / stage of test organis	1	N		
14	Length and/or weight	1	N		
15	Sex	1		N/A	
16	Number of organisms per replicate	1	N		
17	Organism loading rate	1	N		
18	Food type and feeding periods during the acclimation period	1	Y	Fed fish food during acclimation	
	Test design / condition	ns			
19	Test type (acute or chronic	n/a		Acute	
20	Experiment type (laboratory or field	n/a		Lab	
21	Exposure pathways (food, water, both)	n/a		Water	
22	Exposure duration	n/a		96 hr	
23	Negative or positive controls (specify)	1	Υ	Negative	
24	Number of replicates (including controls)	1	Υ	′ 2	
25	Nominal concentrations reported?	1	Y	Y 10, 32, 100, 320, 560, 1000, 1800	
26	Measured concentrations reported?	3	N		
27	Food type and feeding periods during the long-term tests	1		No feeding	
28	Were concentrations measured periodically (especially in the chronic test)?	1	N		

46 47 48	Score: % EC Reliability code:			70.7
				70.7
40				
40	Other adverse effects (e.g. carcinogenicity, mutagenicity) reported?	n/a	N	
45	Other endpoints reported - e.g. BCF/BAF, LOEC/NOEC (specify)?	n/a	N	
44	Toxicity values (specify endpoint and value)	n/a	n/a	Endpoint in mg Co /L, with 95% CL. 96 hr EC50 Very soft water: 128.58 (98.78-192.69)
	Results			
43	Was toxicity value below the chemical's water solubility?	3	Υ	
42	Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)?	1	Υ	
41	Was pH of the test water within the range typical for the Canadian environment (6 to 9)?	1	Υ	
40	Does system type and design (static, semi-static, flow-through; sealed or open; etc.) correspond to the substance's properties and organism's nature/habits?	2	Υ	
39	Were the test conditions (pH, temperature, DO, etc.) typical for the test organism?	1	Y	
38	Was the test organism relevant to the Canadian environment?	3	Υ	
37	Was the endpoint directly caused by the chemical's toxicity, not by organism's health (e.g. when mortality in the control >10%) or physical effects (e.g. 'shading effect')?	n/a		Tests whose controls had >10% mortality were considered invalid
	Information relevant to the da	ta quality	,	
36	Statistical methods used	1	Y	Moving-average- angle method (Harris 1959)
35	Analytical monitoring intervals	1	N	
34	If solubilizer/emulsifier was used, was its ecotoxicity reported?	1		N/A
33	If solubilizer/emulsifier was used, was its concentration reported?	1		N/A
32	Was solubilizer/emulsifier used, if the chemical was poorly soluble or unstable?	1		N/A
31	Stock and test solution preparation	1	Y	Prepared with double-glass distilled water
30	Photoperiod and light intensity	1	Υ	12L:12D
29	Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature)	Temperature: 20 +/- 1 C, pH: 6.6 (6.4- 6.8), Hardness: 12 (10-15) mg CaCO3/L, Alkalinity: 11.5 (10-13) mg CaCO3/L.		

50	Comments	The authors observed the phases of toxicity throughout the test. They noted (in the higher concentrations) rapid twisting movement of the organisms at the beginning of the experiment, followed by reduced tactile movement, loss of segmentation, degeneration of the rear part of the body and then death.
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	Robust Study Summaries Form: Aquatic iT					
No	Item	Weight	Yes/No	Specify		
1	1 Reference: Effects of water hardness and metal concentration on a freshwater <i>Tubifex tubifex</i> Muller. Rathore, R.S., and Khangarot, B.S. 2003. Water, Air, and Soil Pollution 143: 341-356					
2	Substance identity: CAS RN	n/a		7646799		
3	Substance identity: chemical name(s)	n/a		Cobalt chloride CoCl2*6H20		
4	Chemical composition of the substance	2	Υ			
5	Chemical purity	1	Υ	Reagent grade		
6	Persistence/stability of test substance in aquatic solution reported?	1		N/A		
	Method					
7	Reference	1	Υ	APHA et al., 1989		
8	OECD, EU, national, or other standard method?	3	Υ	APHA et al., 1989		
9	Justification of the method/protocol if not a standard method was used	2		N/A		
10	GLP (Good Laboratory Practice)	3	N			
	Test organism					
11	Organism identity: name	n/a		Sludge worm		
12	Latin or both Latin & common names reported?	1	Υ	Tubifex tubifex Muller		
13	Life cycle age / stage of test organis	1	N			
14	Length and/or weight	1	N			
15	Sex	1		N/A		
16	Number of organisms per replicate	1	N			
17	Organism loading rate	1	N			
18	Food type and feeding periods during the acclimation period	during the acclimation 1 Y Fed fish food acclimation		Fed fish food during acclimation		
	Test design / condition	าร				
19	Test type (acute or chronic	n/a		Acute		
20	Experiment type (laboratory or field	n/a		Lab		
21	Exposure pathways (food, water, both)	n/a		Water		
22	Exposure duration	n/a		96 hr		
23	Negative or positive controls (specify)	1	Υ	Negative		
24	Number of replicates (including controls)	1	Υ	2		
25	Nominal concentrations reported?	1	Υ	10, 32, 100, 320, 560, 1000, 1800		
26	Measured concentrations reported?	3	N			
27	Food type and feeding periods during the long-term tests	1		No feeding		
28	Were concentrations measured periodically (especially in the chronic test)?	1	N			
29	Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature)	3	Υ	Temperature: 20 +/- 1 C, pH: 6.6 (6.4- 6.8), Hardness: 45 (38-50) mg CaCO3/L, Alkalinity: 33 (29-38) mg CaCO3/L.		
30	Photoperiod and light intensity	1	Y	12L:12D		
	- •					

31			Prepared with double-glass		
	Was solubilizer/emulsifier used, if the chemical was		distilled water		
32	poorly soluble or unstable?		N/A		
33	If solubilizer/emulsifier was used, was its concentration reported?		N/A		
34	If solubilizer/emulsifier was used, was its ecotoxicity reported?			N/A	
35	Analytical monitoring intervals	1	N		
36	Statistical methods used	1	Υ	Moving-average- angle method (Harris 1959)	
	Information relevant to the da	ta quality	,		
37	Was the endpoint directly caused by the chemical's toxicity, not by organism's health (e.g. when mortality in the control >10%) or physical effects (e.g. 'shading effect')?	n/a		Tests whose controls had >10% mortality were considered invalid	
38	Was the test organism relevant to the Canadian environment?	3	Υ		
39	Were the test conditions (pH, temperature, DO, etc.) typical for the test organism?	1	Υ	Υ	
40	Does system type and design (static, semi-static, flow-through; sealed or open; etc.) correspond to the substance's properties and organism's nature/habits?	2	Υ	Y	
41	Was pH of the test water within the range typical for the Canadian environment (6 to 9)?	1	Y		
42	Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)?	1	1 Y		
43	Was toxicity value below the chemical's water				
	Results	ı	T		
44	Toxicity values (specify endpoint and value)	n/a	n/a	Endpoint in mg Co /L, with 95% CL. 96 hr EC50 Soft Water: 163.68 (109.11- 236.19)	
45	Other endpoints reported - e.g. BCF/BAF, LOEC/NOEC (specify)?	n/a	Ν		
46	Other adverse effects (e.g. carcinogenicity, mutagenicity) reported?	n/a	N		
47	Score: %			70.7	
48	EC Reliability code:			2	
49	Reliability category (high, satisfactory, low):	S	atisfacto	ory Confidence	
50	Comments	The authors observed the phases of toxicity throughout the test. They noted (in the higher concentrations) rapid twisting movement of the organisms at the beginning of the experiment, followed by reduced tactile movement, loss of segmentation, degeneration of the rear part of the body and then death.			

	Robust Study Summaries Form: Aquatic iT				
No	Item	Weight	Yes/No	Specify	
1	Reference: Effects of water hardness and metal concentre Muller. Rathore, R.S., and Khangarot, B.S. 2003 Water, A.				
2	Substance identity: CAS RN	n/a		7646799	
3	Substance identity: chemical name(s)	n/a		Cobalt chloride CoCl2*6H20	
4	Chemical composition of the substance	2	Y		
5	Chemical purity	1	Υ	Reagent grade	
6	Persistence/stability of test substance in aquatic solution reported?	1		N/A	
	Method				
7	Reference	1	Υ	APHA et al., 1989	
8	OECD, EU, national, or other standard method?	3	Υ	APHA et al., 1989	
9	Justification of the method/protocol if not a standard method was used	2		N/A	
10	GLP (Good Laboratory Practice)	3	N		
	Test organism				
11	Organism identity: name	n/a		Sludge worm	
12	Latin or both Latin & common names reported?	1	Y	Tubifex tubifex Muller	
13	Life cycle age / stage of test organis	1	N		
14	Length and/or weight	1	N		
15	Sex	1		N/A	
16	Number of organisms per replicate	1	N		
17	Organism loading rate	1	N		
18	Food type and feeding periods during the acclimation period	1	Y	Fed fish food during acclimation	
	Test design / condition	าร			
19	Test type (acute or chronic	n/a		Acute	
20	Experiment type (laboratory or field	n/a		Lab	
21	Exposure pathways (food, water, both)	n/a		Water	
22	Exposure duration	n/a		96 hr	
23	Negative or positive controls (specify)	1	Υ	Negative	
24	Number of replicates (including controls)	1	Y	2	
25	Nominal concentrations reported?	1	Y	10, 32, 100, 320, 560, 1000, 1800	
26	Measured concentrations reported?	3	N		
27	Food type and feeding periods during the long-term tests	1		No feeding	
28	Were concentrations measured periodically (especially in the chronic test)?	1	N	N	
29	Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature)	3	Υ	Temperature: 20 +/- 1 C, pH: 6.6 (6.4- 6.8), Hardness: 173 (160-184) mg CaCO3/L, Alkalinity: 115 (108-125) mg CaCO3/L.	

30	Photoperiod and light intensity	1	Υ	12L:12D	
31	Stock and test solution preparation	1	Y	Prepared with double-glass distilled water	
32	Was solubilizer/emulsifier used, if the chemical was poorly soluble or unstable?	1		N/A	
33	If solubilizer/emulsifier was used, was its concentration reported?	1		N/A	
34	If solubilizer/emulsifier was used, was its ecotoxicity reported?	1		N/A	
35	Analytical monitoring intervals	1	N		
36	Statistical methods used	1	Y	Moving-average- angle method (Harris 1959)	
	Information relevant to the da	ta quality	/		
37	Was the endpoint directly caused by the chemical's toxicity, not by organism's health (e.g. when mortality in the control >10%) or physical effects (e.g. 'shading effect')?	n/a		Tests whose controls had >10% mortality were considered invalid	
38	Was the test organism relevant to the Canadian environment?	3	Υ		
39	Were the test conditions (pH, temperature, DO, etc.) typical for the test organism?	1	Υ		
40	Does system type and design (static, semi-static, flow-through; sealed or open; etc.) correspond to the substance's properties and organism's nature/habits?	2	Y		
41	Was pH of the test water within the range typical for the Canadian environment (6 to 9)?	1	Υ		
42	Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)?	1	Υ		
43	Was toxicity value below the chemical's water solubility?	3	Y		
	Results	T			
44	Toxicity values (specify endpoint and value)	n/a	n/a	Endpoint in mg Co /L, with 95% CL. 96 hr EC50 Hard Water: 326.45 (258.17-463.32)	
45	Other endpoints reported - e.g. BCF/BAF, LOEC/NOEC (specify)?	n/a	N		
46	Other adverse effects (e.g. carcinogenicity, mutagenicity) reported?	n/a	N		
47	Score: %			70.7	
48	EC Reliability code:			2	
49	Reliability category (high, satisfactory, low):	S	atisfacto	ry Confidence	

50	Comments	The authors observed the phases of toxicity throughout the test. They noted (in the higher concentrations) rapid twisting movement of the organisms at the beginning of the experiment, followed by reduced tactile movement, loss of segmentation, degeneration of the rear part of the body and then death.
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	Robust Study Summaries Fo	rm: Aq	uatic i	Γ		
No	Item	Weight	Yes/No	Specify		
1	Reference: Effects of water hardness and metal concentration on a freshwater <i>Tubifex tubifex</i> Muller. Rathore, R.S., and Khangarot, B.S. 2003 Water, Air, and Soil Pollution 143: 341-356					
2	Substance identity: CAS RN	n/a		7646799		
3	Substance identity: chemical name(s)	n/a		Cobalt chloride CoCl2*6H20		
4	Chemical composition of the substance	2	Υ			
5	Chemical purity	1	Y	Reagent grade		
6	Persistence/stability of test substance in aquatic solution reported?	1		N/A		
	Method					
7	Reference	1	Υ	APHA et al., 1989		
8	OECD, EU, national, or other standard method?	3	Y	APHA et al., 1989		
9	Justification of the method/protocol if not a standard method was used	2		N/A		
10	GLP (Good Laboratory Practice)	3	N			
	Test organism					
11	Organism identity: name	n/a		Sludge worm (Tubifex tubifex)		
12	Latin or both Latin & common names reported?	1	Y	Tubifex tubifex Muller		
13	Life cycle age / stage of test organis	1	N			
14	Length and/or weight	1	N			
15	Sex	1		N/A		
16	Number of organisms per replicate	1	N			
17	Organism loading rate	1	N			
18	Food type and feeding periods during the acclimation period	1	Y	Fed fish food during acclimation		
	Test design / condition	ns	<u> </u>			
19	Test type (acute or chronic	n/a		Acute		
20	Experiment type (laboratory or field	n/a		Lab		
21	Exposure pathways (food, water, both)	n/a		Water		
22	Exposure duration	n/a		96 hr		
23	Negative or positive controls (specify)	1	Υ	Negative		
24	Number of replicates (including controls)	1	Υ	2		
25	Nominal concentrations reported?	1	Υ	10, 32, 100, 320, 560, 1000, 1800		
26	Measured concentrations reported?	3	N			
27	Food type and feeding periods during the long-term tests	1		No feeding		
28	Were concentrations measured periodically (especially in the chronic test)?	1	N			

29	Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature)	3	Y	Temperature: 20 +/- 1 C, pH: 6.6 (6.4- 6.8), Hardness: 305 (275-330) mg CaCO3/L, Alkalinity: 225 (220-250) mg CaCO3/L.
30	Photoperiod and light intensity	1	Υ	12L:12D
31	Stock and test solution preparation	1	Y	Prepared with double-glass distilled water
32	Was solubilizer/emulsifier used, if the chemical was poorly soluble or unstable?	1		N/A
33	If solubilizer/emulsifier was used, was its concentration reported?	1		N/A
34	If solubilizer/emulsifier was used, was its ecotoxicity reported?	1		N/A
35	Analytical monitoring intervals	1	N	
36	Statistical methods used	1	Y	Moving-average- angle method (Harris 1959)
	Information relevant to the da	ta quality	/	
37	Was the endpoint directly caused by the chemical's toxicity, not by organism's health (e.g. when mortality in the control >10%) or physical effects (e.g. 'shading effect')?	n/a		Tests whose controls had >10% mortality were considered invalid
38	Was the test organism relevant to the Canadian environment?	3	Υ	
39	Were the test conditions (pH, temperature, DO, etc.) typical for the test organism?	1	Υ	
40	Does system type and design (static, semi-static, flow-through; sealed or open; etc.) correspond to the substance's properties and organism's nature/habits?	2	Y	
41	Was pH of the test water within the range typical for the Canadian environment (6 to 9)?	1	Υ	
42	Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)?	1	Y	
43	Was toxicity value below the chemical's water solubility?	3	Υ	
	Results			
44	Toxicity values (specify endpoint and value)	n/a	n/a	Endpoint in mg Co /L, with 95% CL. 96 hr EC50 Very Hard Water: 565.76 (386.26-731.94)
45	Other endpoints reported - e.g. BCF/BAF, LOEC/NOEC (specify)?	n/a	N	
46	Other adverse effects (e.g. carcinogenicity, mutagenicity) reported?	n/a	N	
47	Score: %			70.7
48	EC Reliability code:			2
49	Reliability category (high, satisfactory, low):	S	atisfacto	ry Confidence

50	Comments	The authors observed the phases of toxicity throughout the test. They noted (in the higher concentrations) rapid twisting movement of the organisms at the beginning of the experiment, followed by reduced tactile movement, loss of segmentation, degeneration of the rear part of the body and then death.
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	Robust Study Summaries Fo	rm: Aq	uatic i	Г
No	Item	Weight	Yes/No	Specify
1	Reference: The acute toxicity of some heavy metals to di Warnick, S.L., and Bell, H.L. 1969. Research Journal of t 41 (2): 280-284			
2	Substance identity: CAS RN	n/a		10393494
3	Substance identity: chemical name(s)	n/a		Cobaltous sulfate (CoSO4 *7H20)
4	Chemical composition of the substance	2	Υ	
5	Chemical purity	1	N	
6	Persistence/stability of test substance in aquatic solution reported?	1		N/A
	Method			
7	Reference	1	Y	APHA 1965
8	OECD, EU, national, or other standard method?	3	Υ	APHA 1965
9	Justification of the method/protocol if not a standard method was used	2		N/A
10	GLP (Good Laboratory Practice)	3		N/A
	Test organism			<u> </u>
11	Organism identity: name	n/a		Acroneuria lycorias
12	Latin or both Latin & common names reported?	1	Υ	,
13	Life cycle age / stage of test organism	1	N	
14	Length and/or weight	1	N	
15	Sex	1		N/A
16	Number of organisms per replicate	1	Υ	10
17	Organism loading rate	1	N	
18	Food type and feeding periods during the acclimation period	1	N	
	Test design / condition	าร		
19	Test type (acute or chronic	n/a		Acute
20	Experiment type (laboratory or field	n/a		Lab
21	Exposure pathways (food, water, both)	n/a		Water
22	Exposure duration	n/a		8 days
23	Negative or positive controls (specify)	1	Υ	Negative
24	Number of replicates (including controls)	1	N	
25	Nominal concentrations reported?	1	Υ	5 (0.1, 1.0, 4.0, 16.0, 64.0)
26	Measured concentrations reported?	3	N	
27	Food type and feeding periods during the long-term tests	1	N	
28	Were concentrations measured periodically (especially in the chronic test)?	1	N	
29	Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature)	3	Y	Temperature: 18 +/-2, pH: 7.2, Dissolved oxygen: 9.2 mg/L, Hardness: 50 mg CaCO3/L, Alkalinity: 66 mgCaCO3/L.
30	Photoperiod and light intensity	1	N	
		i .	i .	i

Stock and test solution preparation	1	N	
Was solubilizer/emulsifier used, if the chemical was poorly soluble or unstable?	1		N/A
If solubilizer/emulsifier was used, was its concentration reported?	1		N/A
If solubilizer/emulsifier was used, was its ecotoxicity reported?	1		N/A
Analytical monitoring intervals	1	Y	
		N	
Information relevant to the da	ta quality	/	T
Was the endpoint directly caused by the chemical's toxicity, not by organism's health (e.g. when mortality in the control >10%) or physical effects (e.g. 'shading effect')?	n/a	Y	
Was the test organism relevant to the Canadian environment?	3	Υ	
Were the test conditions (pH, temperature, DO, etc.) typical for the test organism?	1	Y	
Does system type and design (static, semi-static, flow-through; sealed or open; etc.) correspond to the substance's properties and organism's nature/habits?	2	Y	
Was pH of the test water within the range typical for the Canadian environment (6 to 9)?	1	Υ	7.2
Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)?	1	Υ	18 +/- 1
Was toxicity value below the chemical's water solubility?	3	Υ	
Results	1	ı	_
Toxicity values (specify endpoint and value)	n/a	n/a	8 day LC50: 32 mg Co/L.
Other endpoints reported - e.g. BCF/BAF, LOEC/NOEC (specify)?	n/a	N	
Other adverse effects (e.g. carcinogenicity, mutagenicity) reported?	n/a	N	
Score: %			64.1
EC Reliability code:	2		
Reliability category (high, satisfactory, low):	Satisfactory Confidence		
Comments	The LC50 was stated as "50% Survival". The authors noted tha metal concentration decreased significantly over 2 weeks, however they believed that for 48, or 96 hr. concentrations are dependable. The also noted that of the 3 specitiested, Ephemerella was the mos sensitive to all the metals tested.		
	Was solubilizer/emulsifier used, if the chemical was poorly soluble or unstable? If solubilizer/emulsifier was used, was its concentration reported? If solubilizer/emulsifier was used, was its ecotoxicity reported? Analytical monitoring intervals Statistical methods used Information relevant to the day Was the endpoint directly caused by the chemical's toxicity, not by organism's health (e.g. when mortality in the control >10%) or physical effects (e.g. 'shading effect')? Was the test organism relevant to the Canadian environment? Were the test conditions (pH, temperature, DO, etc.) typical for the test organism? Does system type and design (static, semi-static, flow-through; sealed or open; etc.) correspond to the substance's properties and organism's nature/habits? Was pH of the test water within the range typical for the Canadian environment (6 to 9)? Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)? Was toxicity value below the chemical's water solubility? Results Toxicity values (specify endpoint and value) Other endpoints reported - e.g. BCF/BAF, LOEC/NOEC (specify)? Other adverse effects (e.g. carcinogenicity, mutagenicity) reported? Score: % EC Reliability code: Reliability category (high, satisfactory, low):	Was solubilizer/emulsifier used, if the chemical was poorly soluble or unstable? If solubilizer/emulsifier was used, was its concentration reported? If solubilizer/emulsifier was used, was its ecotoxicity reported? Analytical monitoring intervals Information relevant to the data quality Was the endpoint directly caused by the chemical's toxicity, not by organism's health (e.g. when mortality in the control >10%) or physical effects (e.g. 'shading effect')? Was the test organism relevant to the Canadian environment? Were the test conditions (pH, temperature, DO, etc.) typical for the test organism's nature/habits? Does system type and design (static, semi-static, flow-through; sealed or open; etc.) correspond to the substance's properties and organism's nature/habits? Was pH of the test water within the range typical for the Canadian environment (6 to 9)? Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)? Was toxicity value below the chemical's water solubility? Results Toxicity values (specify endpoint and value) Other endpoints reported - e.g. BCF/BAF, LOEC/NOEC (specify)? Other adverse effects (e.g. carcinogenicity, mutagenicity) reported? Score: % EC Reliability category (high, satisfactory, low): Scores: Reliability category (high, satisfactory, low):	Was solubilizer/emulsifier used, if the chemical was porly soluble or unstable? If solubilizer/emulsifier was used, was its concentration reported? If solubilizer/emulsifier was used, was its ecotoxicity reported? Analytical monitoring intervals Information relevant to the data quality Was the endpoint directly caused by the chemical's toxicity, not by organism's health (e.g. when mortality in the control >10%) or physical effects (e.g. 'shading effect')? Was the test organism relevant to the Canadian environment? Were the test conditions (pH, temperature, DO, etc.) typical for the test organism? Does system type and design (static, semi-static, flow-through; sealed or open; etc.) correspond to the substance's properties and organism's nature/habits? Was pH of the test water within the range typical for the Canadian environment (6 to 9)? Was temperature of the test water within the range typical for the Canadian environment (6 to 9)? Was toxicity value below the chemical's water solubility? Results Toxicity values (specify endpoint and value) Other endpoints reported - e.g. BCF/BAF, LOEC/NOEC (specify)? Other adverse effects (e.g. carcinogenicity, mutagenicity) reported? Score: % EC Reliability category (high, satisfactory, low): Satisfactory over they believed the concentrations. The also noted it tested, Ephemeir as one of the set water with the substance of the set water with satisfactory and concentrations. The also noted it tested, Ephemeir streams and concentrations. The also noted it tested, Ephemeir streams and concentrations. The also noted it tested, Ephemeir streams and concentrations.

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INO	Item	Weight	Yes/No	Specify
1	Reference: The acute toxicity of some heavy metals to di Warnick, S.L., and Bell, H.L. 1969. Research Journal of t 41 (2): 280-284			
2	Substance identity: CAS RN	n/a		10393494
3	Substance identity: chemical name(s)	n/a		Cobaltous sulfate (CoSO4 *7H20)
4	Chemical composition of the substance	2	Υ	
5	Chemical purity	1	N	
6	Persistence/stability of test substance in aquatic solution reported?	1		N/A
	Method			
7	Reference	1	Υ	APHA 1965
8	OECD, EU, national, or other standard method?	3	Y	APHA 1965
9	Justification of the method/protocol if not a standard method was used	2		N/A
10	GLP (Good Laboratory Practice)	3		N/A
	Test organism			
11	Organism identity: name	n/a		Ephemerella subvaria
12	Latin or both Latin & common names reported?	1	Υ	
13	Life cycle age / stage of test organism	1	N	
14	Length and/or weight	1	N	
15	Sex	1		N/A
16	Number of organisms per replicate	1	Y	10
17	Organism loading rate	1	N	
18	Food type and feeding periods during the acclimation period	1	N	
	Test design / condition	าร	T	1
19	Test type (acute or chronic	n/a		Acute
20	Experiment type (laboratory or field	n/a		Lab
21	Exposure pathways (food, water, both)	n/a		Water
22	Exposure duration	n/a		96 hr
23	Negative or positive controls (specify)	1	Y	Negative
24	Number of replicates (including controls)	1	N	
25	Nominal concentrations reported?	1	Y	5 (0.1, 1.0, 4.0, 16.0, 64.0)
26	Measured concentrations reported?	3	N	
27	Food type and feeding periods during the long-term tests	1	N	
28	Were concentrations measured periodically (especially in the chronic test)?	1	N	
29	Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature)	3	Y	Temperature: 18 +/ 2, pH: 6.9, Dissolved oxygen: 9.2 mg/L, Hardness 50 mg CaCO3/L, Alkalinity: 46 mgCaCO3/L.

30	Photoperiod and light intensity	1	N	
31	Stock and test solution preparation	1	N	
32	Was solubilizer/emulsifier used, if the chemical was poorly soluble or unstable?	1		N/A
33	If solubilizer/emulsifier was used, was its concentration reported?	1		N/A
34	If solubilizer/emulsifier was used, was its ecotoxicity reported?	1		N/A
35	Analytical monitoring intervals	1	Y	
36	Statistical methods used	1	N	
	Information relevant to the da	ta quality	/	
37	Was the endpoint directly caused by the chemical's toxicity, not by organism's health (e.g. when mortality in the control >10%) or physical effects (e.g. 'shading effect')?	n/a	Y	
38	Was the test organism relevant to the Canadian environment?	3	Υ	
39	Were the test conditions (pH, temperature, DO, etc.) typical for the test organism?	1	Υ	
40	Does system type and design (static, semi-static, flow-through; sealed or open; etc.) correspond to the substance's properties and organism's nature/habits?	2	Y	
41	Was pH of the test water within the range typical for the Canadian environment (6 to 9)?	1	Υ	6.9
42	Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)?	1	Υ	18 +/- 1
43	Was toxicity value below the chemical's water solubility?	3	Y	
	Results	1	ı	
44	Toxicity values (specify endpoint and value)	n/a	n/a	96h TLm: 16 mg Co/L.
45	Other endpoints reported - e.g. BCF/BAF, LOEC/NOEC (specify)?	n/a	N	
46	Other adverse effects (e.g. carcinogenicity, mutagenicity) reported?	n/a	N	
47	Score: %			64.1
48	EC Reliability code:			2
49	Reliability category (high, satisfactory, low):	S	atisfacto	ory Confidence
50	Comments	The LC50 was stated as 96 hr "TLI (Median Tolerance Limit). The authors noted that metal concentration decreased significantly over 2 weeks, however they believed that for 48, or 96 hrs concentrations are dependable. The also noted that of the 3 species tested, Ephemerella was the most sensitive to all the metals tested.		

	Robust Study Summaries Form: Aquatic iT					
No	Item	Weight	Yes/No	Specify		
1	Reference: The acute toxicity of some heavy metals to different species of aquatic insects. Warnick, S.L., and Bell, H.L. 1969. Research Journal of the Water Pollution Control Federation. 41 (2): 280-284					
2	Substance identity: CAS RN	n/a		10393494		
3	Substance identity: chemical name(s)	n/a		Cobalt sulfate (CoSO4 *7H20)		
4	Chemical composition of the substance	2	Υ			
5	Chemical purity	1	N			
6	Persistence/stability of test substance in aquatic solution reported?	1		N/A		
	Method					
7	Reference	1	Υ	APHA 1965		
8	OECD, EU, national, or other standard method?	3	Υ	APHA 1965		
9	Justification of the method/protocol if not a standard method was used	2		N/A		
10	GLP (Good Laboratory Practice)	3		N/A		
	Test organism					
11	Organism identity: name	n/a		Hydropsyche betteni		
12	Latin or both Latin & common names reported?	1	Υ			
13	Life cycle age / stage of test organism	1	N			
14	Length and/or weight	1	N			
15	Sex	1		N/A		
16	Number of organisms per replicate	1	Υ	10		
17 18	Organism loading rate Food type and feeding periods during the acclimation	1	N N			
	period					
40	Test design / condition		I	I A .		
19	Test type (acute or chronic	n/a		Acute		
20	Experiment type (laboratory or field	n/a		Lab		
21	Exposure pathways (food, water, both)	n/a		Water		
22	Exposure duration	n/a		7 days		
23 24	Negative or positive controls (specify) Number of replicates (including controls)	1	Y N	Negative		
25	Nominal concentrations reported?	1	Y	5 (0.1, 1.0, 4.0, 16.0, 64.0)		
26	Measured concentrations reported?	3	N	10.0, 01.0)		
27	Food type and feeding periods during the long-term tests	1	N			
28	Were concentrations measured periodically (especially in the chronic test)?	1	N			
29	Were the exposure media conditions relevant to the particular chemical reported? (e.g., for the metal toxicity - pH, DOC/TOC, water hardness, temperature)	3	Y	Temperature: 18 +/-2, pH: 7.0, Dissolved oxygen: 9.2 mg/L, Hardness: 46 mg CaCO3/L, Alkalinity: 46 mgCaCO3/L.		

30	Photoperiod and light intensity	1	N	
31	Stock and test solution preparation	1	N	
32	Was solubilizer/emulsifier used, if the chemical was poorly soluble or unstable?	1		N/A
33	If solubilizer/emulsifier was used, was its concentration reported?	1		N/A
34	If solubilizer/emulsifier was used, was its ecotoxicity reported?	1		N/A
35	Analytical monitoring intervals	1	Y	
36	Statistical methods used	1	N	
	Information relevant to the da	ta quality	/	T
37	Was the endpoint directly caused by the chemical's toxicity, not by organism's health (e.g. when mortality in the control >10%) or physical effects (e.g. 'shading effect')?	n/a	Y	
38	Was the test organism relevant to the Canadian environment?	3	Y	
39	Were the test conditions (pH, temperature, DO, etc.) typical for the test organism?	1	Y	
40	Does system type and design (static, semi-static, flow-through; sealed or open; etc.) correspond to the substance's properties and organism's nature/habits?	2	Y	
41	Was pH of the test water within the range typical for the Canadian environment (6 to 9)?	1	Υ	7.0
42	Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)?	1	Υ	18 +/- 1
43	Was toxicity value below the chemical's water solubility?	3	Υ	
	Results	ı	ı	
44	Toxicity values (specify endpoint and value)	n/a	n/a	7 day LC50: 32 mg Co/L.
45	Other endpoints reported - e.g. BCF/BAF, LOEC/NOEC (specify)?	n/a	N	
46	Other adverse effects (e.g. carcinogenicity, mutagenicity) reported?	n/a	N	
47	Score: %			64.1
48	EC Reliability code:	code: 2		
49	Reliability category (high, satisfactory, low):	Satisfactory Confidence		
50	Comments	The LC50 was stated as "50% Survival". The authors noted that metal concentration decreased significantly over 2 weeks, howeve they believed that for 48, or 96 hrs, concentrations are dependable. The also noted that of the 3 species tested, Ephemerella was the most sensitive to all the metals tested.		