

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:

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

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 Form: Aquatic iT				
No	Item	Weight	Yes/No	Specify
1	Reference: Evaluation of <i>Philodina acuticornis</i> (rotifera) as a bioassay organism for heavy metals. Buikema, Jr., A.L., Cairns Jr., J., and Sullivan, G.W. 1974. Water Resources Bulletin. 10 (4): 648-661			
2	Substance identity: CAS RN	n/a		7646799
3	Substance identity: chemical name(s)	n/a		Cobalt chloride (CoCl ₂ *6H ₂ O)
4	Chemical composition of the substance	2	Y	
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		<i>Philodina acuticornis</i> (Rotifera)
12	Latin or both Latin & common names reported?	1	Y	
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	Y	20-450
17	Organism loading rate	1	N	
18	Food type and feeding periods during the acclimation period	1	Y	
Test design / conditions				
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	Y	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	

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	Y	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	Y	probit analysis (Dixon, 1970)
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	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	Y	
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	Y	
Results				
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): Satisfactory Confidence			
50	Comments	Tests were performed with soft and hard water, however only results with soft water allowed for the calculation of an EC50.		

Robust Study Summaries Form and Instructions: Aquatic iT				
No	Item	Weight	Yes/No	Specify
1	Reference: [CDI] The Cobalt Development Institute 2008b. Evaluation of chronic toxicity of cobalt to the aquatic oligochaete, <i>Aeolosoma</i> 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	CoCl ₂ *6H ₂ O
4	Chemical composition of the substance	2	Y	
5	Chemical purity	1	Y	99.90%
6	Persistence/stability of test substance in aquatic solution reported?	1	N	
Method				
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 method was used	2	Y	
10	GLP (Good Laboratory Practice)	3	Y	
Test organism				
11	Organism identity: name	n/a		<i>Aeolosoma</i> sp.
12	Latin or both Latin & common names reported?	1	Y	
13	Life cycle age / stage of test organism	1	Y	<24 hours old at start
14	Length and/or weight	1	N	
15	Sex	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	Infusoria
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	1	Y	Infusoria
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	
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	Y	
36	Statistical methods used	1	Y	TRAP/piecewise linear gression
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		
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	static-renewall
41	Was pH of the test water within the range typical for the Canadian environment (6 to 9)?	1	Y	7.4-7.8
42	Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)?	1	Y	24-25
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 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 Instructions: 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	Y	7646799
3	Substance identity: chemical name(s)	n/a	Y	CoCl ₂ *6H ₂ O
4	Chemical composition of the substance	2	Y	
5	Chemical purity	1	Y	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	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	Y	
Test organism				
11	Organism identity: name	n/a		<i>Brachyodanio rerio</i>
12	Latin or both Latin & common names reported?	1	Y	
13	Life cycle age / stage of test organism	1	Y	Start as freshly-fertilized eggs
14	Length and/or weight	1	Y	growth assessed
15	Sex	1	N	
16	Number of organisms per replicate	1	Y	25
17	Organism loading rate	1	Y	
18	Food type and feeding periods during the acclimation period	1	Y	Infusoria
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	33 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	1	Y	Infusoria
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	
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	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	Y	TRAP/piecewise linear regression
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		
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	flow-through
41	Was pH of the test water within the range typical for the Canadian environment (6 to 9)?	1	Y	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	Y	
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	Score: ... %		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. Short-term Chronic Toxicity of Cobalt to <i>Ceriodaphnia dubia</i> . Testing laboratory: Parametrix Environmental Research Laboratory. Report no.: 4248-43. A report to the Cobalt Development Institute. Guildford, Surrey, United Kingdom.			
2	Substance identity: CAS RN	n/a	Y	7646799
3	Substance identity: chemical name(s)	n/a	Y	CoCl ₂ *6H ₂ O
4	Chemical composition of the substance	2	Y	
5	Chemical purity	1	N	
6	Persistence/stability of test substance in aquatic solution reported?	1	N	
Method				
7	Reference	1	Y	USEPA 2002
8	OECD, EU, national, or other standard method?	3	Y	USEPA
9	Justification of the method/protocol if not a standard method was used	2	N/A	
10	GLP (Good Laboratory Practice)	3	Y	
Test organism				
11	Organism identity: name	n/a	Y	<i>Ceriodaphnia dubia</i>
12	Latin or both Latin & common names reported?	1	Y	
13	Life cycle age / stage of test organism	1	Y	< 24h old at start
14	Length and/or weight	1	N	
15	Sex	1	N	
16	Number of organisms per replicate	1	Y	1
17	Organism loading rate	1	Y	
18	Food type and feeding periods during the acclimation period	1	Y	algae and YCT
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	21 d
23	Negative or positive controls (specify)	1	Y	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	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	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	Y	
36	Statistical methods used	1	Y	threshold sigmoid regression
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		
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	static-renewal
41	Was pH of the test water within the range typical for the Canadian environment (6 to 9)?	1	Y	8.0-8.7
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	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			
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: Pacific Ecorisk 2005. An Evaluation of the Acute Toxicity of Cobalt in Panther Creek Water to Three Resident Invertebrate Species (<i>Brachycentrus americanus</i> , <i>Centroptilum conturbatum</i> , and <i>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 Site Group. Report date: 3 Feb 2005.			
2	Substance identity: CAS RN	n/a	Y	10124433
3	Substance identity: chemical name(s)	n/a	Y	CoSO4
4	Chemical composition of the substance	2	Y	no details on purity
5	Chemical purity	1	N	
6	Persistence/stability of test substance in aquatic solution reported?	1	Y	Appendix O
Method				
7	Reference	1	Y	USEPA 2000
8	OECD, EU, national, or other standard method?	3	Y	USEPA
9	Justification of the method/protocol if not a standard method was used	2	NA	
10	GLP (Good Laboratory Practice)	3	N	
Test organism				
11	Organism identity: name	n/a	Y	<i>Chironomus tentans</i>
12	Latin or both Latin & common names reported?	1	Y	
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	
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	1	Y	Fish flakes
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	Just photo, not intensity
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	Y	
36	Statistical methods used	1	Y	type of fit/software for EC10 determination?
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		
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	flow-through
41	Was pH of the test water within the range typical for the Canadian environment (6 to 9)?	1	Y	7.58-8.17
42	Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)?	1	Y	23 ± 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 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	Score: ... %		88.4	
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 2009e. Heijerick D, Ghekiere A, Van Sprang P, De Schampheleere K, Deleebeeck N, Janssen C. 2007. Effect of cobalt (CoCl ₂ ·6H ₂ O) on freshwater organisms. Testing laboratory: EURAS & Laboratory of Environmental Toxicology, Ghent University. A report to the Cobalt Development Institute. Guildford, Surrey, United Kingdom.			
2	Substance identity: CAS RN	n/a		7646799
3	Substance identity: chemical name(s)	n/a		CoCl ₂ ·6H ₂ O
4	Chemical composition of the substance	2	Y	
5	Chemical purity	1	N	
6	Persistence/stability of test substance in aquatic solution reported?	1	N	
Method				
7	Reference	1	Y	OECD 1984
8	OECD, EU, national, or other standard method?	3	Y	OECD 211
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	Y	<i>Daphnia magna</i>
12	Latin or both Latin & common names reported?	1	Y	
13	Life cycle age / stage of test organism	1	Y	<24 h at start
14	Length and/or weight	1	N	
15	Sex	1	N	
16	Number of organisms per replicate	1	Y	1
17	Organism loading rate	1	Y	
18	Food type and feeding periods during the acclimation period	1	Y	zooplankton
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	21 d
23	Negative or positive controls (specify)	1	Y	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	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	Y	
36	Statistical methods used	1	Y	Statistica/Mann-Whitney U-test
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		
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	semi-static
41	Was pH of the test water within the range typical for the Canadian environment (6 to 9)?	1	Y	7.22-7.64
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	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: ... %			84.1
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 2009e. Heijerick D, Ghekiere A, Van Sprang P, De Schampheleere K, Deleebeeck N, Janssen C. 2007. Effect of cobalt (CoCl ₂ ·6H ₂ O) on freshwater organisms. Testing laboratory: EURAS & Laboratory of Environmental Toxicology, Ghent University. A report to the Cobalt Development Institute. Guildford, Surrey, United Kingdom.			
2	Substance identity: CAS RN	n/a	Y	7646799
3	Substance identity: chemical name(s)	n/a	Y	CoCl ₂ ·6H ₂ O
4	Chemical composition of the substance	2	Y	
5	Chemical purity	1	N	
6	Persistence/stability of test substance in aquatic solution reported?	1	N	
Method				
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	Y	method fully described, validity criteria used from OECD 202
10	GLP (Good Laboratory Practice)	3	N	
Test organism				
11	Organism identity: name	n/a	Y	<i>Hyalella azteca</i>
12	Latin or both Latin & common names reported?	1	Y	
13	Life cycle age / stage of test organism	1	Y	6-7 d at start
14	Length and/or weight	1	Y	growth assessed
15	Sex	1	N/A	
16	Number of organisms per replicate	1	Y	3
17	Organism loading rate	1	Y	3 Org/100 ml
18	Food type and feeding periods during the acclimation period	1	Y	YTC/algal suspension
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	28 d
23	Negative or positive controls (specify)	1	Y	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	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	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	Y	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 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		
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	2x wk, static-renewal
41	Was pH of the test water within the range typical for the Canadian environment (6 to 9)?	1	Y	7.15-7.69
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	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 Instructions: Aquatic iT				
No	Item	Weight	Yes/No	Specify
1	Reference: [CDI] The Cobalt Development Institute 2009e. Heijerick D, Ghekiere A, Van Sprang P, De Schampheleere K, Deleebeeck N, Janssen C. 2007. Effect of cobalt (CoCl ₂ ·6H ₂ O) on freshwater organisms. Testing laboratory: EURAS & Laboratory of Environmental Toxicology, Ghent University. A report to the Cobalt Development Institute. Guildford, Surrey, United Kingdom.			
2	Substance identity: CAS RN	n/a	Y	7646799
3	Substance identity: chemical name(s)	n/a	Y	CoCl ₂ ·6H ₂ O
4	Chemical composition of the substance	2	Y	
5	Chemical purity	1	N	
6	Persistence/stability of test substance in aquatic solution reported?	1	N	
Method				
7	Reference	1	Y	OECD 2002
8	OECD, EU, national, or other standard method?	3	Y	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				
11	Organism identity: name	n/a		<i>Lemna minor</i>
12	Latin or both Latin & common names reported?	1	Y	
13	Life cycle age / stage of test organism	1	Y	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	Y	
18	Food type and feeding periods during the acclimation period	1	Y	modified SSI-culturing medium
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	7 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	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	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	Y	
36	Statistical methods used	1	Y	Statsoft/non-linear estimations
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		
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	static
41	Was pH of the test water within the range typical for the Canadian environment (6 to 9)?	1	Y	6.52-6.68
42	Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)?	1	Y	24 ± 2
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 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	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 2009d. Early life-stage toxicity of cobalt to the 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		CoCl ₂ *6H ₂ O
4	Chemical composition of the substance	2	Y	
5	Chemical purity	1	Y	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	Y	
Test organism				
11	Organism identity: name	n/a	Y	<i>Oncorhynchus mykiss</i>
12	Latin or both Latin & common names reported?	1	Y	
13	Life cycle age / stage of test organism	1	Y	Start as freshly-fertilized eggs
14	Length and/or weight	1	Y	growth assessed
15	Sex	1	N	
16	Number of organisms per replicate	1	Y	50 start, thinned to 20
17	Organism loading rate	1	Y	
18	Food type and feeding periods during the acclimation period	1	Y	trout chow
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	81 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	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	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	Y	
36	Statistical methods used	1	Y	TRAP/log-logistic or piecewise linear regression
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		
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	flow-through
41	Was pH of the test water within the range typical for the Canadian environment (6 to 9)?	1	Y	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	Y	
Results				
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	Score: ... %			95.5
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 2009e. Heijerick D, Ghekiere A, Van Sprang P, De Schampheleere K, Deleebeeck N, Janssen C. 2007. Effect of cobalt (CoCl ₂ ·6H ₂ O) on freshwater organisms. Testing laboratory: EURAS & Laboratory of Environmental Toxicology, Ghent University. A report to the Cobalt Development Institute. Guildford, Surrey, United Kingdom			
2	Substance identity: CAS RN	n/a	Y	7646799
3	Substance identity: chemical name(s)	n/a	Y	CoCl ₂ ·6H ₂ O
4	Chemical composition of the substance	2	Y	
5	Chemical purity	1	N	
6	Persistence/stability of test substance in aquatic solution reported?	1	N	
Method				
7	Reference	1	Y	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				
11	Organism identity: name	n/a	Y	<i>Pseudokirchneriella subcapitata</i>
12	Latin or both Latin & common names reported?	1	Y	
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	Y	
17	Organism loading rate	1	Y	1x10 ⁴ cells/ml
18	Food type and feeding periods during the acclimation period	1	Y	OECD 201 media with replacement of EDTA with DOC
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	4 d
23	Negative or positive controls (specify)	1	Y	negative
24	Number of replicates (including controls)	1	Y	3
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	
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	
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	Y	
36	Statistical methods used	1	Y	Statsoft/non-linear estimations
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		
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	static
41	Was pH of the test water within the range typical for the Canadian environment (6 to 9)?	1	Y	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	Y	
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
48	EC Reliability code:			2
49	Reliability category (high, satisfactory, low):			Satisfactory Confidence
50	Comments			

Robust Study Summaries Form and Instructions: Aquatic iT				
No	Item	Weight	Yes/No	Specify
1	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	Y	7646799
3	Substance identity: chemical name(s)	n/a	Y	CoCl ₂ *6H ₂ O
4	Chemical composition of the substance	2	Y	
5	Chemical purity	1	Y	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	Y	
Test organism				
11	Organism identity: name	n/a		<i>Pimephales promelas</i>
12	Latin or both Latin & common names reported?	1	Y	
13	Life cycle age / stage of test organism	1	Y	Start as freshly-fertilized eggs
14	Length and/or weight	1	Y	growth assessed
15	Sex	1	N	
16	Number of organisms per replicate	1	Y	25
17	Organism loading rate	1	Y	
18	Food type and feeding periods during the acclimation period	1	Y	Brine shrimp
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	34 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	1	Y	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	
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	Y	
36	Statistical methods used	1	Y	TRAP/log-logistic or piecewise linear regression
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		
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	flow-throw
41	Was pH of the test water within the range typical for the Canadian environment (6 to 9)?	1	Y	7.6-8.5
42	Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)?	1	Y	24-27
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 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 cobalt to embryos and larvae of zebrafish, <i>Brachydanio rerio</i> . Dave, G., and Xiu, R. 1991. Archives of Environmental Contamination and Toxicology. 21: 126-134			
2	Substance identity: CAS RN	n/a		7646799
3	Substance identity: chemical name(s)	n/a		Cobalt Chloride (CoCl ₂ *6H ₂ O)
4	Chemical composition of the substance	2	Y	
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	Y	
10	GLP (Good Laboratory Practice)	3		N/A
Test organism				
11	Organism identity: name	n/a		Zebrafish (<i>Brachydanio rerio</i>)
12	Latin or both Latin & common names reported?	1	Y	
13	Life cycle age / stage of test organism	1	Y	Embryos and larvae
14	Length and/or weight	1		N/A
15	Sex	1		N/A
16	Number of organisms per replicate	1	Y	30 eggs, reduced to 10
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		16 days
23	Negative or positive controls (specify)	1	Y	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	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: 25.4-26.4 C, pH: 7.5-7.7, Hardness: 100, Dissolved oxygen ranged from 88-100% saturation.
30	Photoperiod and light intensity	1	Y	12h light and 12h dark
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	Y	
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	Control early embryo mortality was 16.5%.
38	Was the test organism relevant to the Canadian environment?	3	N	
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	7.5-7.7
42	Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)?	1	Y	25.4-26.4
43	Was toxicity value below the chemical's water solubility?	3	Y	
Results				
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: Hatching time, MATC: 10840, Survival time, MATC: 340 (MATC reported as geometric mean of NOEC and LOEC)
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	<i>Concentrations were not listed in the text, however the authors reported 11 concentrations, with a dilution factor of 0.5. Combining 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.</i>
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Robust Study Summaries Form: Aquatic iT				
No	Item	Weight	Yes/No	Specify
1	Reference: De Schampelaere, 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	Y	
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	
Test organism				
11	Organism identity: name	n/a		<i>Lymnaea stagnalis</i>
12	Latin or both Latin & common names reported?	1	Y	
13	Life cycle age / stage of test organis	1	Y	31 days old
14	Length and/or weight	1	Y	Mean wet weight: 22.8 +/- 6.2 mg
15	Sex	1		N/A
16	Number of organisms per replicate	1	Y	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 / 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		28d
23	Negative or positive controls (specify)	1	Y	Negative
24	Number of replicates (including controls)	1	Y	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	Temperature: 20 C, pH: 7.6-7.9, Hardness: 140 mg/L
30	Photoperiod and light intensity	1	Y	12L:12D
31	Stock and test solution preparation	1	Y	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	Y	
36	Statistical methods used	1	Y	
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	No mortality was observed.
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	Y	7.6-7.9
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	Y	
Results				
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	EC Reliability code:	2		

49	Reliability category (high, satisfactory, low): Satisfactory Confidence	
50	Comments	<i>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.</i>

Robust Study Summaries Form: Aquatic iT				
No	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	Y	Analytical-grade
6	Persistence/stability of test substance in aquatic solution reported?	1		N/A
Method				
7	Reference	1	Y	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		<i>Spirodela polyrhiza</i> (L.) Schleid.
12	Latin or both Latin & common names reported?	1	Y	
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 / conditions				
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	Y	Negative
24	Number of replicates (including controls)	1	Y	5
25	Nominal concentrations reported?	1	Y	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	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	Y	
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	
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	Y	7.0
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): 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 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	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	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		<i>Pimphales promelas</i>
12	Latin or both Latin & common names reported?	1	Y	
13	Life cycle age / stage of test organism	1	Y	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	Y	20 eggs/ 10 fry
17	Organism loading rate	1	N	
18	Food type and feeding periods during the acclimation period	1	N	
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		28 days
23	Negative or positive controls (specify)	1	Y	Negative
24	Number of replicates (including controls)	1	Y	4
25	Nominal concentrations reported?	1	Y	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	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	Y	
36	Statistical methods used	1	Y	
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	
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	Y	Mean 8.14
42	Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)?	1	Y	Mean 24.4
43	Was toxicity value below the chemical's water solubility?	3	Y	
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: ... %			75.0
48	EC Reliability code:			2
49	Reliability category (high, satisfactory, low):			Satisfactory Confidence

50	Comments	<i>Hatchability in all treatments were generally equivalent to the controls. There was a slight, yet significant decrease 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.</i>
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Robust Study Summaries Form: Aquatic iT				
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	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	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		<i>Daphnia magna</i>
12	Latin or both Latin & common names reported?	1	Y	
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	1
17	Organism loading rate	1	N	
18	Food type and feeding periods during the acclimation period	1	N	
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		28d
23	Negative or positive controls (specify)	1	Y	Negative
24	Number of replicates (including controls)	1	Y	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	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	Y	
36	Statistical methods used	1	Y	
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	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	Y	
41	Was pH of the test water within the range typical for the Canadian environment (6 to 9)?	1	Y	Mean 8.31
42	Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)?	1	Y	Mean 20.3
43	Was toxicity value below the chemical's water solubility?	3	Y	
Results				
44	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
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: ... %			
48	EC Reliability code:			
49	Reliability category (high, satisfactory, low):			
50	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).			

Robust Study Summaries Form: Aquatic iT				
No	Item	Weight	Yes/No	Specify
1	Reference: Effects of cadmium, cobalt, copper, and nickel on growth of the green alga <i>Chlamydomonas reinhardtii</i> : 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.			
2	Substance identity: CAS RN	n/a		7646799
3	Substance identity: chemical name(s)	n/a	Y	Cobalt chloride
4	Chemical composition of the substance	2	Y	
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		<i>Chlamydomonas reinhardtii</i>
12	Latin or both Latin & common names reported?	1	Y	
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	
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	12 (0, 5, 20, 30, 40, 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)?	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 +/- 2 C, pH: 6.8
30	Photoperiod and light intensity	1	Y	Continuous light, 86 +/- 10 umol/m^2/s
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	Y	
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	
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	Y	6.8
42	Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)?	1	Y	25 +/- 2
43	Was toxicity value below the chemical's water solubility?	3	Y	
Results				
44	Toxicity values (specify endpoint and value)	n/a	n/a	5 day EC30: 1 120 µg Co/L (19.0µM) - 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, ultrastructure, and metal tolerance of the green alga, <i>Chlamydomonas acidophila</i> (Chlorophyta). Nishikawa, K., and Tominaga, N. 2001. Bioscience, Biotechnology, Biochemistry. 65 (12). 2650-2656.			
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	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	
Test organism				
11	Organism identity: name	n/a		<i>Chlamydomonas acidophila</i> (Chlorophyta)
12	Latin or both Latin & common names reported?	1	Y	
13	Life cycle age / stage of test organism	1	Y	Exponential growth phase (5-7 days)
14	Length and/or weight	1		N/A
15	Sex	1		N/A
16	Number of organisms per replicate	1	Y	Concentration of 5×10^5 cells/ml. 10 ml. Therefore 5×10^6 cells
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		96 hr
23	Negative or positive controls (specify)	1	Y	Negative
24	Number of replicates (including controls)	1	Y	3
25	Nominal concentrations reported?	1	Y	4 (0, 10, 50, 100 μ M)
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 C, pH: 4.0
30	Photoperiod and light intensity	1	Y	12L:12D

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	Y	APHA
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	
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	N	4
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	Y	
Results				
44	Toxicity values (specify endpoint and value)	n/a	n/a	96 hr EC50 (growth): 69.5uM or 4096 ug(free, Co2+)/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: ... % 63.4			
48	EC Reliability code: 2			
49	Reliability category (high, satisfactory, low): Satisfactory Confidence			
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.		

Robust Study Summaries Form: Aquatic iT				
No	Item	Weight	Yes/No	Specify
1	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 (CoCl ₂ *6H ₂ O)
4	Chemical composition of the substance	2	Y	
5	Chemical purity	1	Y	analytical 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	
9	Justification of the method/protocol if not a standard method was used	2	Y	
10	GLP (Good Laboratory Practice)	3	N	
Test organism				
11	Organism identity: name	n/a		<i>Hyalella azteca</i>
12	Latin or both Latin & common names reported?	1	Y	
13	Life cycle age / stage of test organism	1	Y	0-1 week old
14	Length and/or weight	1		n/a
15	Sex	1		n/a
16	Number of organisms per replicate	1	Y	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 / conditions				
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	Y	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 the 28 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 CaCO ₃ for the same reconstituted water recipe (Norwood et al. 2006).
30	Photoperiod and light intensity	1	Y	16 h light/8 h dark photoperiod
31	Stock and test solution preparation	1	Y	from analytical 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	Y	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	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	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	Y	25C
43	Was toxicity value below the chemical's water solubility?	3	Y	
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 (inhibition of growth body concentration)
46	Other adverse effects (e.g. carcinogenicity, mutagenicity) reported?	n/a	N	
47	Score: ... %			72.1
48	EC Reliability code:			2
49	Reliability category (high, satisfactory, low):			Satisfactory Confidence
50	Comments	<i>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.</i>		

Short-term (acute)

Robust Study Summaries Form: Aquatic iT				
No	Item	Weight	Yes/No	Specify
1	Reference: Acute toxicity of various metals to freshwater zooplankton. Baudouin, M.F. and Scoppa, P. 1974. Bulletin of Environmental Contamination and Toxicology. 12 (6): 745-751			
2	Substance identity: CAS RN	n/a		7646799
3	Substance identity: chemical name(s)	n/a		Cobalt chloride (CoCl ₂ *6H ₂ O)
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	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		<i>Cyclops abyssorum prealpinus</i>
12	Latin or both Latin & common names reported?	1	Y	
13	Life cycle age / stage of test organism	1	Y	Adults
14	Length and/or weight	1	Y	0.62mm
15	Sex	1	N	
16	Number of organisms per replicate	1	Y	1 (to avoid cannibalism)
17	Organism loading rate	1	N	
18	Food type and feeding periods during the acclimation period	1	N	
Test design / conditions				
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	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	Y	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 1% mortality
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	Y	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	Y	
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):			Satisfactory 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 zooplankton. Baudouin, M.F. and Scoppa, P. 1974. Bulletin of Environmental Contamination and Toxicology. 12 (6): 745-751			
2	Substance identity: CAS RN	n/a		7646799
3	Substance identity: chemical name(s)	n/a		Cobalt chloride (CoCl ₂ *6H ₂ O)
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	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		<i>Eudiaptomus padanus padanus</i>
12	Latin or both Latin & common names reported?	1	Y	
13	Life cycle age / stage of test organis	1	Y	Adults
14	Length and/or weight	1	Y	0.43mm
15	Sex	1	N	
16	Number of organisms per replicate	1	Y	1 (to avoid cannibalism)
17	Organism loading rate	1	N	
18	Food type and feeding periods during the acclimation period	1	N	
Test design / conditions				
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	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	Y	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 9.8% mortality after 10 days. (test was only 48 hrs)
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	Y	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	Y	
Results				
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):			Satisfactory 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 zooplankton. Baudouin, M.F. and Scoppa, P. 1974. Bulletin of Environmental Contamination and Toxicology. 12 (6): 745-751			
2	Substance identity: CAS RN	n/a		7646799
3	Substance identity: chemical name(s)	n/a		Cobalt chloride (CoCl ₂ *6H ₂ O)
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	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	Y	<i>Daphnia hyalina</i>
12	Latin or both Latin & common names reported?	1	Y	
13	Life cycle age / stage of test organism	1	Y	Adults
14	Length and/or weight	1	Y	1.27mm
15	Sex	1		Assume to be female.
16	Number of organisms per replicate	1	Y	Daphnia: 15-20
17	Organism loading rate	1	N	
18	Food type and feeding periods during the acclimation period	1	N	
Test design / conditions				
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	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	Y	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	Y	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	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	Y	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	Y	
Results				
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
49	Reliability category (high, satisfactory, low):			Satisfactory 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: Effects of various metals on survival, growth, reproduction, and metabolism of <i>Daphnia magna</i> . Biesinger, K.,E. and Christensen, G.,M. 1972. J. Fish. Res.Bd Canada. 29: 1691-1700.			
2	Substance identity: CAS RN	n/a		7646799
3	Substance identity: chemical name(s)	n/a		Cobalt Chloride CoCl ₂ *6H ₂ O
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	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		<i>Daphnia magna</i>
12	Latin or both Latin & common names reported?	1	Y	
13	Life cycle age / stage of test organis	1	Y	12 days, +/- 12 hr
14	Length and/or weight	1		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 / conditions				
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	Number of replicates (including controls)	1	Y	Acute: two
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	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 measurements, 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	Y	16 hr photoperiod, ~115 ft-c
31	Stock and test solution preparation	1	Y	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	Y	Reference: Litchfield and Wilcoxon (1949)
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	N	Did not report control organism health/response
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	Y	7.4-8.2
42	Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)?	1	Y	18 +/- 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	48hr LC50: 1.11 mg 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	<i>Tested total of 21 compounds. For all metals tested, acute median lethal concentrations were higher with than without food.</i>		

Robust Study Summaries Form: Aquatic iT				
No	Item	Weight	Yes/No	Specify
1	Reference: Toxicity of sixty-three metals and metalloids to <i>Hyalella azteca</i> at two levels of water hardness. Borgmann U., Couillard, Y., Doyle, P., and George Dixon, D. 2005. Environmental 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/l
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	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		<i>Hyalella azteca</i>
12	Latin or both Latin & common names reported?	1	Y	
13	Life cycle age / stage of test organism	1	Y	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 / conditions				
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	Y	Negative
24	Number of replicates (including controls)	1	Y	1 replicate for metal, 3 replicates for controls
25	Nominal concentrations reported?	1	Y	10, 32, 100 ug/L
26	Measured concentrations reported?	3	Y	
27	Food type and feeding periods during the long-term tests	1	Y	Fed at initiation and midweek with Tetra-Min

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	pH:8.09-8.84 , Conductivity: 311 (288-345), Temperature: 24-25, oxygen concentrations:7-10mg/L, Hardness: 124mg/L.
30	Photoperiod and light intensity	1	Y	16:8 photoperiod
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	Y	
36	Statistical methods used	1	Y	Trimmed Spearman-Kärber
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	Only data with control survival >80% was used.
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	Y	Tap water: 8.39 (8.09 - 8.84); Soft Water 7.37 (6.79 - 7.84)
42	Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)?	1	Y	24-25
43	Was toxicity value below the chemical's water solubility?	3	Y	
Results				
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)
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: ... %			77.3

48	EC Reliability code:		2
49	Reliability category (high, satisfactory, low):		Satisfactory Confidence
50	Comments	<i>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.</i>	

Robust Study Summaries Form: Aquatic iT				
No	Item	Weight	Yes/No	Specify
1	Reference: Aquatic toxicity of forty industrial chemicals: testing in support of hazardous substance spill prevention regulation. Cutis, M.W. and Ward, C.H. 1981. Journal of Hydrology, 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	Y	
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 (<i>Pimephales promelas</i>)
12	Latin or both Latin & common names reported?	1	Y	
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 / conditions				
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
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: 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	Y	
36	Statistical methods used	1	Y	
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	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	Y	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):		Satisfactory Confidence	

50	Comments	<i>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 compared to cobalt.</i>
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Robust Study Summaries Form: Aquatic iT				
No	Item	Weight	Yes/No	Specify
1	Reference: Individual and interactive lethal toxicity of cadmium, potassium permanganate and cobalt chloride to fish, worm and plankton. Das, B.K., and Kaviraj, A. 1994. Geobios 21: 223-227.			
2	Substance identity: CAS RN	n/a		7646799
3	Substance identity: chemical name(s)	n/a		Cobalt chloride (CoCl ₂)
4	Chemical composition of the substance	2	Y	
5	Chemical purity	1	Y	Analytical grade.
6	Persistence/stability of test substance in aquatic solution reported?	1		N/A
Method				
7	Reference	1	Y	APHA 1975.
8	OECD, EU, national, or other standard method?	3	Y	
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		<i>Cyprinus carpio</i>
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	Y	L: 3.0 +/- 0.29 cm, W:0.30g
15	Sex	1	N	
16	Number of organisms per replicate	1	Y	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 / conditions				
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	

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	Probit Analysis
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	No control mortality
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	N	Don't know, not reported.
42	Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)?	1	N	Don't know, not reported.
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: 151.28 (147.96-154.36)
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: ... %			61.5
48	EC Reliability code:			2
49	Reliability category (high, satisfactory, low):			Satisfactory Confidence
50	Comments	Endpoint reported as parent compound (mg/L CoCl₂): 332.98 (326.00-340.10). Data from tests on teleost fish (<i>Heteropneustes fossilis</i>), was not significant, therefore and LC50 was not calculated.		

Robust Study Summaries Form: Aquatic iT				
No	Item	Weight	Yes/No	Specify
1	Reference: Simultaneous evaluation of the acute effects of chemicals on seven aquatic species. Ewell, W.S., Gorsuch, J.W., Kringle, R.O., Robillard, K.A., and Spiegel, R.C. 1986. 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	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	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		<i>Pimephales promelas</i>
12	Latin or both Latin & common names reported?	1	Y	
13	Life cycle age / stage of test organism	1	Y	Juvenile
14	Length and/or weight	1	Y	0.2-0.5g
15	Sex	1		N/A (juvenile)
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 / conditions				
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	Y	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, Hardness: 130mg/L, Alkalinity: 93 mg/L
30	Photoperiod and light intensity	1	Y	16L:8D, 50 ft-c
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	Y	
36	Statistical methods used	1	Y	
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	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	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	6.5-8.5
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	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): Satisfactory 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, segmented worm) in separate baskets that were suspended into the test vessel.		

Robust Study Summaries Form: Aquatic iT				
No	Item	Weight	Yes/No	Specify
1	Reference: Relationship between heavy metal accumulation and toxicity in <i>Spirodela polyrrhiza</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	Y	Analytical-grade
6	Persistence/stability of test substance in aquatic solution reported?	1		N/A
Method				
7	Reference	1	Y	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		<i>Azolla pinnata</i> R.Br.
12	Latin or both Latin & common names reported?	1	Y	
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 / conditions				
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	Y	14L:10D, 45 umol/m ² /s
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	Y	
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	
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	Y	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) μ M 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
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 Instructions: Aquatic iT				
No	Item	Weight	Yes/No	Specify
1	Reference: Toxicity of metals to a freshwater tubificid worm, <i>Tubifex tubifex</i> (Muller). Khangarot, B.S., 1991. Bulletin of Environmental Contamination and Toxicology. 46:906-912			
2	Substance identity: CAS RN	n/a		7646799
3	Substance identity: chemical name(s)	n/a		Cobalt chloride CoCl ₂ *6H ₂ O
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	Y	APHA et al., 1981
8	OECD, EU, national, or other standard method?	3	Y	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		<i>Tubifex tubifex</i> (Muller)
12	Latin or both Latin & common names reported?	1	Y	
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 / conditions				
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	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 CaCO ₃ , Alkalinity: 400 (390-410) mg/L CaCO ₃)

30	Photoperiod and light intensity	1	N	
31	Stock and test solution preparation	1	Y	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	Y	
36	Statistical methods used	1	Y	
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	
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	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	Y	
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 Form: Aquatic iT				
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 (CoCl ₂ *6H ₂ O)
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	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		<i>Daphnia magna</i>
12	Latin or both Latin & common names reported?	1	Y	
13	Life cycle age / stage of test organism	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 / conditions				
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	3 replicates
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	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) CaCO ₃ , Alkalinity: 400 (390-415) mg/L CaCO ₃ .
30	Photoperiod and light intensity	1	N	
31	Stock and test solution preparation	1	Y	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	Y	
36	Statistical methods used	1	Y	
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	N	Did not report control organism 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	Y	
41	Was pH of the test water within the range typical for the Canadian environment (6 to 9)?	1	Y	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	Y	Mean: 13 (11.5-14.5)
43	Was toxicity value below the chemical's water solubility?	3	Y	
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	N	
47	Score: ... %	69.2		
48	EC Reliability code:	2		
49	Reliability category (high, satisfactory, low):	Satisfactory Confidence		

50	Comments	<i>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.</i>
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Robust Study Summaries Form: Aquatic iT				
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 (CoCl ₂ *6H ₂ O)
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	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				
11	Organism identity: name	n/a		<i>Tubifex tubifex</i> Muller
12	Latin or both Latin & common names reported?	1	Y	
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 / conditions				
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	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: 6.0 (6.0-6.3), Hardness: 305 mg/L CaCO ₃ , Alkalinity: 225 mg/L CaCO ₃ .
30	Photoperiod and light intensity	1	Y	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	Y	moving-average-angle method
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	All control test organisms survived
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	Y	6.0-6.3
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	Y	
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	N	
47	Score: ... %			66.7
48	EC Reliability code:			2
49	Reliability category (high, satisfactory, low):			Satisfactory Confidence
50	Comments	<i>The authors concluded that slight difference in experimental conditions, especially pH, result in changes in EC50 values that make direct comparisons of relative acute sensitivities impractical.</i>		

Robust Study Summaries Form: Aquatic iT				
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 (CoCl ₂ *6H ₂ O)
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	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				
11	Organism identity: name	n/a		<i>Tubifex tubifex</i> Muller
12	Latin or both Latin & common names reported?	1	Y	
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 / conditions				
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	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: 7.0 (7.0-7.3), Hardness: 305 mg/L CaCO ₃ , Alkalinity: 225 mg/L CaCO ₃ .
30	Photoperiod and light intensity	1	Y	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	Y	moving-average-angle method
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	All control test organisms survived
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	Y	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	Y	
Results				
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
50	Comments	<i>The authors concluded that slight difference in experimental conditions, especially pH, result in changes in EC50 values that make direct comparisons of relative acute sensitivities impractical.</i>		

Robust Study Summaries Form: Aquatic iT				
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 (CoCl ₂ *6H ₂ O)
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	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				
11	Organism identity: name	n/a		<i>Tubifex tubifex</i> Muller
12	Latin or both Latin & common names reported?	1	Y	
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 / conditions				
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	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 CaCO ₃ , Alkalinity: 225 mg/L CaCO ₃ .
30	Photoperiod and light intensity	1	Y	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	Y	moving-average-angle method
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	All control test organisms survived
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	Y	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	Y	
Results				
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	<i>The authors concluded that slight difference in experimental conditions, especially pH, result in changes in EC50 values that make direct comparisons of relative acute sensitivities impractical.</i>		

Robust Study Summaries Form: Aquatic iT				
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	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	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		<i>Pimephales promelas</i>
12	Latin or both Latin & common names reported?	1	Y	
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	Y	10
17	Organism loading rate	1	N	
18	Food type and feeding periods during the acclimation period	1	N	
Test design / conditions				
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	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	Y	
36	Statistical methods used	1	Y	
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	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	Y	
41	Was pH of the test water within the range typical for the Canadian environment (6 to 9)?	1	Y	Mean 8.16
42	Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)?	1	Y	Mean 25.4
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: 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):			Satisfactory 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 Form: Aquatic iT				
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	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	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		<i>Daphnia magna</i>
12	Latin or both Latin & common names reported?	1	Y	
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 / conditions				
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	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	Y	
36	Statistical methods used	1	Y	
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	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	Y	
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	Y	Mean: 20.4
43	Was toxicity value below the chemical's water solubility?	3	Y	
Results				
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):			Satisfactory 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 Form: Aquatic iT				
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	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	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		<i>Daphnia magna</i>
12	Latin or both Latin & common names reported?	1	Y	
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 / conditions				
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	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: 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	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	Y	
36	Statistical methods used	1	Y	
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	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	Y	
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	Y	Mean: 20.4
43	Was toxicity value below the chemical's water solubility?	3	Y	
Results				
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
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	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 Form: Aquatic iT				
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 (CoCl ₂ *6H ₂ O)
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	Y	Sprague 1969
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	
Test organism				
11	Organism identity: name	n/a		Rainbow trout (<i>Oncorhynchus mykiss</i>)
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	Y	Length: 29-32mm
15	Sex	1	N	
16	Number of organisms per replicate	1	Y	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 / conditions				
19	Test type (acute or chronic)	n/a	Y	Acute
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 days, but LC50/LC20 calculated at 96 and 144 hrs
23	Negative or positive controls (specify)	1	Y	Negative control
24	Number of replicates (including controls)	1	Y	6
25	Nominal concentrations reported?	1	Y	0, 125, 250, 500, 1000, 2000
26	Measured concentrations reported?	3	Y	
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

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 CaCO ₃ , Alkalinity: 24.9 (3.6 SD) mg/L CaCO ₃
30	Photoperiod and light intensity	1	Y	12-hr light/dark cycle
31	Stock and test solution preparation	1	Y	Salts dissolved in 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	Y	Every three days
36	Statistical methods used	1	Y	probit regression
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	
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	Y	7.51 (SD:0.11)
42	Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)?	1	Y	10
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 with 95% CL in ug Co/L: 144hr LC50: 520(286-945) 144 hr LC20: 228(99-522)
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: ... %			84.4
48	EC Reliability code:			1

49	Reliability category (high, satisfactory, low):		High Confidence
50	Comments	<i>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.</i>	

Robust Study Summaries Form: Aquatic iT				
No	Item	Weight	Yes/No	Specify
1	Reference: The acute lethal toxicity of heavy metals to peracarid crustaceans (with particular reference to fresh-water asellids and gammarids). Martin, T., and Holdich, D. 1986. Water Research 20 (9): 1137-1147			
2	Substance identity: CAS RN	n/a		7646799
3	Substance identity: chemical name(s)	n/a		Cobalt chloride (CoCl ₂ *6H ₂ O)
4	Chemical composition of the substance	2	Y	
5	Chemical purity	1	Y	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	Y	
10	GLP (Good Laboratory Practice)	3		N/A
Test organism				
11	Organism identity: name	n/a		<i>Crangonyx pseudogracilis</i>
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	Y	Mean 4mm, approx. 0.2 mg dry wt
15	Sex	1	N	
16	Number of organisms per replicate	1	Y	20-30
17	Organism loading rate	1	N	
18	Food type and feeding periods during the acclimation period	1	Y	
Test design / conditions				
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	

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.
30	Photoperiod and light intensity	1	Y	12h light:dark cycle
31	Stock and test solution preparation	1	Y	Salt dissolved in 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	N	
36	Statistical methods used	1	Y	
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	N	Did not report control organism health/response.
38	Was the test organism relevant to the Canadian environment?	3	N	Introduced species
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	6.7-6.8
42	Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)?	1	Y	13
43	Was toxicity value below the chemical's water solubility?	3	Y	
Results				
44	Toxicity values (specify endpoint and value)	n/a	n/a	96h LC50 with 95% CL: 39.2 (35.3-43.3) ppm Cobalt.
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: ... %	63.4		
48	EC Reliability code:	2		
49	Reliability category (high, satisfactory, low):	Satisfactory Confidence		

50	Comments	<i>Authors also tested several other compounds (18) on the amphipod. The authors also exposed Asellus aquaticus to different metals, but not cobalt.</i>
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Robust Study Summaries Form: Aquatic iT				
No	Item	Weight	Yes/No	Specify
1	Reference: Effects of temperature on the sensitivity of sludge worm <i>Tubifex tubifex</i> Muller to selected heavy metals. Rathore, R., and Khangarot, B. 2002. <i>Exotoxicology and Environmental Safety</i> 53: 27-36			
2	Substance identity: CAS RN	n/a		7646799
3	Substance identity: chemical name(s)	n/a		Cobalt chloride CoCl ₂ *6H ₂ O
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	Y	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 (<i>Tubifex tubifex</i>)
12	Latin or both Latin & common names reported?	1	Y	
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	N	
17	Organism loading rate	1	N	
18	Food type and feeding periods during the acclimation period	1	N	
Test design / conditions				
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	Y	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	Y	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	Y	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 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	%Mortality in all controls was 0.
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	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	Y	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	15+/- 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-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):			Satisfactory Confidence
50	Comments	<i>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).</i>		

Robust Study Summaries Form: Aquatic iT				
No	Item	Weight	Yes/No	Specify
1	Reference: Effects of temperature on the sensitivity of sludge worm <i>Tubifex tubifex</i> Muller to selected heavy metals. Rathore, R., and Khangarot, B. 2002. Exotoxicology and Environmental Safety 53: 27-36			
2	Substance identity: CAS RN	n/a		7646799
3	Substance identity: chemical name(s)	n/a		Cobalt chloride CoCl ₂ *6H ₂ O
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	Y	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 (<i>Tubifex tubifex</i>)
12	Latin or both Latin & common names reported?	1	Y	
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	N	
Test design / conditions				
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	Y	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	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	Y	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 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	%Mortality in all controls was 0.
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	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	Y	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	Y	
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	

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	<i>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).</i>		

Robust Study Summaries Form: Aquatic iT				
No	Item	Weight	Yes/No	Specify
1	Reference: Effects of temperature on the sensitivity of sludge worm <i>Tubifex tubifex</i> Muller to selected heavy metals. Rathore, R., and Khangarot, B. 2002. Exotoxicology and Environmental Safety 53: 27-36			
2	Substance identity: CAS RN	n/a		7646799
3	Substance identity: chemical name(s)	n/a		Cobalt chloride CoCl ₂ *6H ₂ O
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		
Method				
7	Reference	1	Y	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 (<i>Tubifex tubifex</i>)
12	Latin or both Latin & common names reported?	1	Y	
13	Life cycle age / stage of test organism	1	N	
14	Length and/or weight	1	N	
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 / conditions				
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	Y	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	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	Y	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 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	%Mortality in all controls was 0.
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	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	Y	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	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	96-h EC50 with 95% CL: 247.23 (204.63-341.26) mgCo/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):			Satisfactory Confidence
50	Comments	<i>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).</i>		

Robust Study Summaries Form: Aquatic iT				
No	Item	Weight	Yes/No	Specify
1	Reference: Effects of temperature on the sensitivity of sludge worm <i>Tubifex tubifex</i> Muller to selected heavy metals. Rathore, R.S., and Khangarot, B. 2002. Exotoxicology and Environmental Safety 53: 27-36			
2	Substance identity: CAS RN	n/a		7646799
3	Substance identity: chemical name(s)	n/a		Cobalt chloride CoCl ₂ *6H ₂ O
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	Y	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 (<i>Tubifex tubifex</i>)
12	Latin or both Latin & common names reported?	1	Y	
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	N	
17	Organism loading rate	1	N	
18	Food type and feeding periods during the acclimation period	1	N	
Test design / conditions				
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	Y	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	Y	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	Y	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 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	%Mortality in all controls was 0.
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	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	Y	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	30 +/- 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-h EC 50 with 95% CL :95.31 (82.04-116.68) 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):			Satisfactory Confidence
50	Comments	<i>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).</i>		

Robust Study Summaries Form: Aquatic iT				
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 CoCl ₂ *6H ₂ O
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	Y	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 (<i>Tubifex tubifex</i>)
12	Latin or both Latin & common names reported?	1	Y	<i>Tubifex tubifex</i> Muller
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	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 / conditions				
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	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	

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: 12 (10-15) mg CaCO ₃ /L, Alkalinity: 11.5 (10-13) mg CaCO ₃ /L.
30	Photoperiod and light intensity	1	Y	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 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		Tests whose controls had >10% mortality were considered invalid
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	Y	
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	Y	
Results				
44	Toxicity values (specify endpoint and value)	n/a	n/a	Endpoint in mg Co /L, with 95% CL. 96 hr EC ₅₀ Very soft water: 128.58 (98.78-192.69)
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):			Satisfactory Confidence

50	Comments	<i>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.</i>
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Robust Study Summaries Form: Aquatic iT				
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 CoCl ₂ *6H ₂ O
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	Y	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
12	Latin or both Latin & common names reported?	1	Y	<i>Tubifex tubifex</i> Muller
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	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 / conditions				
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	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	
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: 45 (38-50) mg CaCO ₃ /L, Alkalinity: 33 (29-38) mg CaCO ₃ /L.
30	Photoperiod and light intensity	1	Y	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 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		Tests whose controls had >10% mortality were considered invalid
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	Y	
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	Y	
Results				
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	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):			Satisfactory Confidence
50	Comments	<i>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.</i>		

Robust Study Summaries Form: Aquatic iT				
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 CoCl ₂ *6H ₂ O
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	Y	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
12	Latin or both Latin & common names reported?	1	Y	<i>Tubifex tubifex</i> Muller
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	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 / conditions				
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	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	
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: 173 (160-184) mg CaCO ₃ /L, Alkalinity: 115 (108-125) mg CaCO ₃ /L.

30	Photoperiod and light intensity	1	Y	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 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		Tests whose controls had >10% mortality were considered invalid
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	Y	
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	Y	
Results				
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):			Satisfactory Confidence

50	Comments	<i>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.</i>
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Robust Study Summaries Form: Aquatic iT				
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 CoCl ₂ *6H ₂ O
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	Y	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 (<i>Tubifex tubifex</i>)
12	Latin or both Latin & common names reported?	1	Y	<i>Tubifex tubifex</i> Muller
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	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 / conditions				
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	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	

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	Y	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 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		Tests whose controls had >10% mortality were considered invalid
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	Y	
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	Y	
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):			Satisfactory Confidence

50	Comments	<i>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.</i>
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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		Cobaltous sulfate (CoSO ₄ *7H ₂ O)
4	Chemical composition of the substance	2	Y	
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	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		<i>Acronuria lycorias</i>
12	Latin or both Latin & common names reported?	1	Y	
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 / conditions				
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	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: 7.2, Dissolved oxygen: 9.2 mg/L, Hardness: 50 mg CaCO ₃ /L, Alkalinity: 66 mgCaCO ₃ /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 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	
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	Y	7.2
42	Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)?	1	Y	18 +/- 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	8 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:			2
49	Reliability category (high, satisfactory, low):			Satisfactory Confidence
50	Comments	<i>The LC50 was stated as "50% Survival". 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.</i>		

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		Cobaltous sulfate (CoSO ₄ *7H ₂ O)
4	Chemical composition of the substance	2	Y	
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	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		<i>Ephemerella subvaria</i>
12	Latin or both Latin & common names reported?	1	Y	
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 / conditions				
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 CaCO ₃ /L, Alkalinity: 46 mgCaCO ₃ /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 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	
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	Y	6.9
42	Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)?	1	Y	18 +/- 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	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):			Satisfactory Confidence
50	Comments <i>The LC50 was stated as 96 hr "TLm" (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.</i>			

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 *7H2O)
4	Chemical composition of the substance	2	Y	
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	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		<i>Hydropsyche betteni</i>
12	Latin or both Latin & common names reported?	1	Y	
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 / conditions				
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	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: 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 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	
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	Y	7.0
42	Was temperature of the test water within the range typical for the Canadian environment (5 to 27°C)?	1	Y	18 +/- 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	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:			2
49	Reliability category (high, satisfactory, low):			Satisfactory Confidence
50	Comments	<i>The LC50 was stated as "50% Survival". 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.</i>		