

Final Report

Ammonium Niobium Oxalate: Toxicity to Microorganisms Activated Sludge, Respiration Inhibition Test

Guideline

OECD Guideline 209 (2010)

Study Director

Dr. Silke Falk

Date

12 May 2014

Testing Facility

Eurofins Agrosience Services
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Sponsor

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Study Identification Code

Test item:	Ammonium Niobium Oxalate
Study code:	S14-00480
Trial/Lab Phase code:	S14-00480-L1_AAHT

Statement of Confidentiality

This report contains confidential and proprietary information of the sponsor which must not be disclosed to anyone except the employees of this company or to persons authorised by law or judicial judgement without the expressed and written approval of the sponsor.

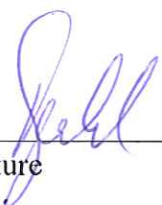
Statement of Compliance with the Principles of Good Laboratory Practice

The study described in this report was conducted in compliance with the most recent edition of:

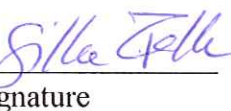
- The Principles of Good Laboratory Practice (GLP), (Chemical Act, attachment 1, Federal Republic of Germany)
- The OECD Principles of Good Laboratory Practice

The German requirements are based on the OECD Principles of Good Laboratory Practice which are accepted by regulatory authorities throughout the European Community, the United States of America (FDA and EPA) and Japan (MHW, MAFF and METI) on the basis of intergovernmental agreements.

Head of testing facility
(Dr. Martin Feyerabend / Dr. S. Timmermann)

19 May 2014 
Date / Signature

Study director
(Dr. Silke Falk)

12 May '14 
Date / Signature

Statement of Quality Assurance Unit

Study code: S14-00480

Study title: Ammonium Niobium Oxalate: Toxicity to Microorganisms Activated Sludge, Respiration Inhibition Test

This study has been audited by the relevant Quality Assurance Unit(s) in accordance with the OECD principles of Good Laboratory Practice and respective national regulations. Dates of inspection and reporting are listed in this section, or in the phase reports supplied by the test site(s). Documents were audited as draft versions. Facilities and/or processes and systems are monitored as part of a regular program.

	Date of Audit	Date of Report to Principal Investigator	Date of Report to Study Director ¹⁾	Date of Report to Management ²⁾
Study Plan	05 Feb 2014	-	05 Feb 2014	05 Feb 2014
Amendment 1	11 Mar 2014	-	11 Mar 2014	11 Mar 2014
Amendment 2	08 May 2014	-	08 May 2014	08 May 2014
Experimental Phase Measuring Oxygen Content	26 Feb 2014	-	26 Feb 2014	26 Feb 2014
Final Report	16 Apr 2014	-	16 Apr 2014	16 Apr 2014

¹⁾ including Lead QA and test facility management if audit reported to Principal Investigator

²⁾ test site management if audit reported to Principal Investigator, otherwise test facility management

- not applicable

According to the inspections detailed above, and the QA Statements provided by the test sites it can be confirmed that the methods, procedures, and observations described in this final report are a full and accurate account of the raw data.

Quality assurance
(Dr. Ulrich Schwarz)

15 May 2014 U. Schwarz
Date / Signature

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1 Summary

Report:	FALK, S. (2014): Ammonium Niobium Oxalate: Toxicity to Microorganisms Activated Sludge, Respiration Inhibition Test
Source:	Eurofins Agrosience Services EcoChem GmbH, Eutinger Str. 24, 75223 Niefern-Öschelbronn, Germany; unpublished report no.: S14-00480; Issued: 12 May 2014
Guidelines:	OECD guideline 209 (2010)
Deviations:	No major
GLP:	Yes, certified laboratory
Objective:	The respiration rate of an activated sludge, fed with a standard amount of synthetic wastewater feed, was measured 3 hours after application of the test item. The inhibitory effects of Ammonium Niobium Oxalate in particular concentrations were expressed as a percentage of the mean respiration rate of the controls.
Materials and methods:	Ammonium Niobium Oxalate, Batch number: AD/4663, Purity analysed: 99.4 % (w/w). Activated sludge from the municipal wastewater treatment plant of Pforzheim, Germany, was used as microbial inoculum for the test. This plant predominantly is treating domestic sewage. The sludge was adjusted to a final content of 1.5 g/L dry matter in the test solutions and was exposed to the test item under continuous aeration for 3 hours. Thereafter the respiration rate (O₂ consumption) of the sludge microorganisms was measured for approx. 5 minutes. The O₂ consumption is an indication for toxic effects on respiration activity of microorganisms. Following a range-finding test with nominal test item concentrations of 10.0, 100 and 1000 mg/L a main test was performed with 100 mg/L test item. In the main test control, test item concentrations and abiotic control were tested in three replicates. Four concentrations of 3,5-dichlorophenol (DCP) as toxic reference item were tested in parallel to demonstrate the sensitivity of the test system.
Date of work:	25 Feb 2014 – 14 Mar 2014

Findings: The results of the main test are presented below:

Test assay nominal [mg/L]	Mean inhibition after 3 h [%]
100	-8.3
DCP 0.2	-2.4
DCP 1	18.0
DCP 5	24.2
DCP 25	87.9

Conclusions: The test item Ammonium Niobium Oxalate had no statistically significant inhibitory effect on the total oxygen uptake of activated sludge microorganisms at 100 mg/L after 3 hours. The NOEC is therefore determined to be 100 mg/L.

All validity criteria of OECD Guideline for Testing of Chemicals No. 209 were fulfilled.

- The mean oxygen uptake rate of the blank control (without test item or reference substance) was determined to be 23 mg O₂/(g×h) dry matter after 3 hours. There was not less than 20 mg O₂/(g×h) dry matter.
- The coefficient of variation of oxygen uptake rate in control replicates were 16 % after 3 hours and did not exceed 30% at the end of the main test.
- The EC₅₀ of the total oxygen uptake for DCP was estimated within a range of 5 to 25 mg/L after 3 hours. This is within the accepted range of 2 to 25 mg/L for total respiration.

2 Time Schedule

Study initiation date:	17 Feb 2014
Start of the experimental phase:	25 Feb 2014
End of the experimental phase:	14 Mar 2014
Draft report:	25 Mar 2014
Study completion date:	12 May 2014

3 Study Objective

The effects of Ammonium Niobium Oxalate on the total respiration rate of activated sludge microorganisms were determined under laboratory conditions.

3.1 Principle of the Test

The test was performed in accordance with OECD Guideline 209: "Activated Sludge, Respiration Inhibition Test (Carbon and Ammonium Oxidation)" (2010).

The oxygen uptake rate of activated sludge fed with a standard amount of synthetic sewage feed was measured after a contact time of 3 hours. The total oxygen uptake rate of the same batch of activated sludge in the presence of various concentrations of the test item under otherwise identical conditions was also measured.

The inhibitory effect of the test item at a particular concentration was expressed as a percentage of the mean oxygen uptake rate of controls. The NOEC (No Observed Effect Concentration) was determined.

A reference item 3,5-dichlorophenol (3,5-DCP) was tested at the same time to demonstrate that the sensitivity of the sludge is in the normal range.

Any oxygen uptake arising from abiotic process was detected by determining the rate in mixture of test item, synthetic sewage feed and water, omitting activated sludge. No effect of this abiotic control was determined during the main test.

4 Materials and Methods

4.1 Test and Reference Item(s)

Test Item			
Common name	Ammonium Niobium Oxalate (ANO)	Batch number	AD/4663
Chemical name	Reaction mass of ammonium diaqua[bis(oxalate)]oxoniobate(1-) hydrate and ammonium hydrogen oxalate oxalic acid (1:1:1) dehydrate	Appearance / colour	powder/white
Test item code	2012-003688	Intended usage	-
Formulation type	-	Purity analysed	99.4 % (w/w)
CAS number	-	Molecular weight	-
Chemical structure	-	Risk symbol(s)	not available
Density (20 °C) analysed	not relevant	Expiry date	25 March 2015
Certificate of analysis	27 March 2014	Storage conditions	ambient
Stability in application solution	not applicable		

Reference Item			
Name / Code	3,5 dichlorophenol (DCP)	Batch number	10157809
Test item code	2013-002899	Appearance / colour	powder/ yellowish
CAS number	591-35-5	Purity analysed	99.4 %
Density	--	Risk symbol(s)	Xn, Xi, N
Certificate of analysis	--	Expiry date (determined as one year after receipt)	02 May 2014
Stability in application solution	sufficient for the test purpose (at least 1h)	Storage conditions	ambient, dark, dry

A solution of 1.00 g of 3,5-dichlorophenol in 1000 mL of water will be prepared. The pH of the solution should be checked and adjusted, if necessary, with NaOH or H₂SO₄ to pH 7 – 8

All specifications given on the certificate of analysis, provided by the sponsor/supplier are essential for correct identification of the test item for use under GLP. They have not been verified by the test facility and no claim of GLP compliance will be made for these data except where this is explicitly claimed on the certificate of analysis. Additional specifications for test item

characterisation may originate from (non-GLP) sources other than the sponsor/supplier.

4.2 Microbial Inoculum

Activated sludge from the municipal wastewater treatment plant of 75172 Pforzheim, Germany, collected from the aeration tank was used as the microbial inoculum for the test. This plant was predominantly treating domestic sewage.

The sludge was used one day after collection. It was settled and the upper layer with finer solids was decanted and discarded. Before starting the test, the remaining sludge was washed two times with tap water by centrifugation (10 minutes at 3000 rpm). After centrifuging, the supernatant was decanted and discarded and the sludge was resuspended in chlorine free tap water. This procedure was repeated once.

The mixed liquor suspended solids (MLSS) in the sludge inoculum were adjusted to a concentration of 3.0 g/L ($\pm 10\%$). The activated sludge was continuously aerated at the test temperature, the solids did not settle down.

4.3 Synthetic Medium

The test was performed in a synthetic sewage feed that was prepared with the following amounts of substances in 1 litre of deionised water:

- 16 g peptone
- 11 g meat extract
- 3 g urea
- 0.7 g NaCl
- 0.4 g $\text{CaCl}_2 \times 2 \text{H}_2\text{O}$
- 0.2 g $\text{MgSO}_4 \times 7 \text{H}_2\text{O}$
- 2.8 g K_2HPO_4

The solution was sterilized prior to storage. If the preparation was not used immediately it was stored in the dark at a temperature of between 0 – 10 °C for 4 days.

4.4 Performance of the Test

4.4.1 Preparation of Test Solutions

Prior to the main test, a range-finding test was performed with nominal test item concentrations of 10.0, 100 and 1000 mg/L.

For the determination of a NOEC the main test was performed with the test item concentrations 100 mg/L. Three replicates were prepared for the control, abiotic control and the test item concentrations.

To the test mixtures (500 mL), which contained deionised water (234 mL), synthetic seawage feed (16 mL) and the appropriate test / reference item concentration, the inoculum of activated sludge (250 mL) was added. The test item was prepared by directly weighing 50 mg of the test item into 500 mL. All components were dispersed by intense aeration.

A stock solution of 3,5-dichlorophenol was prepared by dissolving 200 mg DCP in 200 mL water. The reference item was dosed by dissolving defined volumes of the stock solution in the test solutions.

The preparation of the test assays is summarised in Table 1.

Table 1: Preparation of the test solutions in the main test

Test assay [mg/L]	Synthetic medium [mL]	Water [mL]	DCP stock solution ¹⁾ [mL]	Test item (required) ²⁾ [mg]	Activated sludge [mL]	Final volume [mL]	Number of replicate
Control	16	234	-	-	250	500	3
100	16	234	-	50	250	500	3
DCP 0.2	16	234	0.1	-	250	500	1
DCP 1	16	233	0.5	-	250	500	1
DCP 5	16	231	2.5	-	250	500	1
DCP 25	16	222	12.5	-	250	500	1
Abiotic control	16	484	-	50	0	500	3

¹⁾ concentration of DCP stock solution 1.00 g/L

²⁾ weighed directly into the test vessels

4.4.2 Procedure of the Test and Test Design

The test solutions without microbial inoculum were aerated for some minutes to saturate the solutions with O₂ above 60 - 70 %. Then the test was started (t₀ = 0 hours) by adding 250 mL of microbial inoculum. During the incubation period of 3 hours all test solutions were continuously aerated by compressed air.

The total oxygen consumption rate of the microorganisms was measured 3 hours after test start. The pH of the test solutions were determined once after test start.

The reference assay with the concentrations 0.2, 1, 5, and 25 mg/L was set up in the same way as the test item. The blank control was set up in the same way as the test item concentrations but without test item. The abiotic control was prepared without microbial inoculum but with the test item concentration of 100 mg/L and filled up with water to a final volume.

4.4.3 Test Conditions of the Main Test

Duration:	3 hours, during which the test assays were aerated
Test vessels:	1 litre glass beakers
Test volume:	500 mL
Nutrient solution:	16 mL synthetic sewage feed
Temperature in the main test:	19.3 – 20.9 °C (measured during O ₂ -determination after 3 h of exposure)
pH of control:	7.21 - 7.25
pH of test item concentration and abiotic control:	6.38 -6.88

4.5 Assessments

4.5.1 Oxygen Concentration

Respiration rate measurements were conducted 3 hours after test start (t_0) which was defined as the initial contact of the activated sludge inoculum with the other constituents of the final mixture. The test solution was filled into a BOD-flask and stirred, and the oxygen concentration was measured and recorded over a period of about 5 minutes without further aeration. All treatments were measured in the same way at approximately 5-minute intervals.

4.5.2 Temperature

The temperature in all test solutions was measured simultaneously with oxygen concentration.

4.5.3 pH

The pH in all test solutions was measured after test start (results see Table 7).

4.6 Data Evaluation

4.6.1 Evaluation of Oxygen Uptake

The oxygen uptake rate was calculated from regression line resulting from the measured O₂ values [mg O₂/(L×h)] between 2.0 and 7.0 mg/L. Nevertheless, concentration ranges below and above these values are occasionally unavoidable and necessary. This is acceptable provided the extended sections of the uptake graph are straight and their gradients do not change as they pass through the 2.0 or 7.0 mg/L boundaries.

The specific oxygen uptake rate (R_S) was expressed as the amount of oxygen consumed per g dry weight of sludge per hour [mg O₂/(g×h)].

In order to calculate any inhibitory effect of the test item, the total oxygen uptake rate was expressed as a percentage of the mean of the control oxygen uptake rates and calculated as follows:

$$I_T = \left[1 - \frac{R_T - R_{TA}}{R_{TB}}\right] \times 100\%$$

where:

- I_T = inhibition of total oxygen consumption [%]
- R_T = O₂ - consumption rate, total oxygen uptake rate [mg/(L×h)] in treatment
- R_{TB} = O₂ - consumption rate, total oxygen uptake rate [mg/(L×h)] in blanc control (average of all control replicates)

4.6.2 Statistics

The statistical evaluation was performed for specific respiration rate of the control and the test item concentrations using SAS® (2002–2010). The calculation was performed using SAS Software service pack 9.3. The NOEC was determined using the t-Test pooled. P-values below 0.05 showed statistically significant differences to the control

5 Deviations from the Study Plan

The study was performed according to the study plan dated 17 Feb 2014, amendment No 1 dated 11 Mar 2014 and amendment No 2 dated 12. May 2014 without any deviation having impact on the outcome of the study. This report reflects the conduct of this study.

6 Results

6.1 Range-Finding Test

The specific respiration rate of the range-finding test and the percentage inhibition are summarised in Table 2 and Table 3.

Table 2: Results of the range-finding test, specific respiration rates

Test assay nominal [mg/L]	Specific respiration rates after 3 h [mg O ₂ /(g × h)]
Control (1)	24.13
Control (2)	24.58
Control (3)	23.93
10.0	23.71
100	24.06
1000 (1)	0.88
1000 (2)	0.27
1000 (3)	0.63
DCP 0.2	23.44
DCP 1	18.35
DCP 5	14.94
DCP 25	3.47
Abiotic control	-0.26

Table 3: Results of the range-finding test, inhibition

Test assay nominal [mg/L]	Inhibition after 3 h [%]
10.0	2.1
100	0.6
1000 (mean)	97.6
DCP 0.2	3.2
DCP 1	24.2
DCP 5	38.3
DCP 25	85.7

6.2 Main Test

The specific respiration rate and the percentage inhibition are summarised in Table 4 and Table 5. Figure 1 present the inhibition values of the reference item DCP. Individual values are shown in Appendix 1. No chemical oxygen depletion was observed in the abiotic control. The specific respiration rate of the abiotic control was between -0.19 to 0.35 mg O₂/(g × h).

Table 4: Specific respiration rates in the main test

Test assay nominal [mg/L]	Specific respiration rates after 3 h [mg O ₂ /(g × h)]
Control (1)	24.11
Control (2)	25.04
Control (3)	18.53
Mean	22.56
Stdev	3.52
CV (%)	16
100 (1)	22.57
100 (2)	24.65
100 (3)	26.07
Mean	24.43
Stdev	1.76
DCP 0.2	23.11
DCP 1	18.50
DCP 5	17.09
DCP 25	2.73
Abiotic control (1)	-0.19
Abiotic control (2)	0.35
Abiotic control (3)	0.01

Table 5: Inhibition of total oxygen uptake in the main test

Test assay nominal [mg/L]	Mean inhibition after 3 h [%]
100	-8.3
DCP 0.2	-2.4
DCP 1	18.0
DCP 5	24.2
DCP 25	87.9

The test item Ammonium Niobium Oxalate had no statistically significant inhibitory effect on the total oxygen uptake of activated sludge microorganisms at 100 mg/L after 3 hours. The NOEC is therefore determined to be 100 mg/L.

The EC₅₀ of the total oxygen uptake for the reference item DCP was estimated to be between 5 and 25 mg/L after 3 hours. This is within the recommended range of 2 to 25 mg/L.

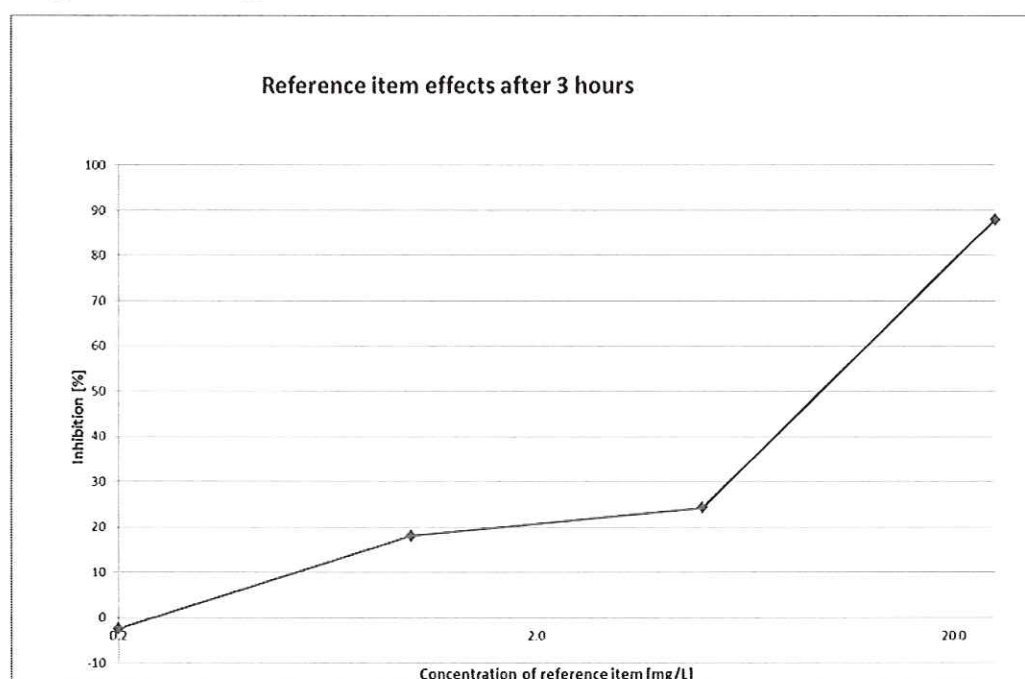


Figure 1: Effects of the reference item DCP on the total respiration rate after 3 hours

7 Validity Criteria of the Study

All validity criteria of OECD Guideline for Testing of Chemicals No. 209 were fulfilled:

- The mean oxygen uptake rate of the blank control (without test item or reference substance) was determined to be 23 mg O₂/(g×h) dry matter after 3 hours. There was not less than 20 mg O₂/(g×h) dry matter.
- The coefficient of variation of oxygen uptake rate in control replicates were 16 % after 3 hours and did not exceed 30% at the end of the main test.
- The EC₅₀ of the total oxygen uptake for DCP was estimated to be within a range of 5 to 25 mg/L after 3 hours. This is within the accepted range of 2 to 25 mg/L for total respiration.

8 Conclusions

The test item Ammonium Niobium Oxalate had no statistically significant inhibitory effect on the total oxygen uptake of activated sludge microorganisms at 100 mg/L after 3 hours. The NOEC is therefore determined to be 100 mg/L. All validity criteria of OECD Guideline for Testing of Chemicals No. 209 were fulfilled.

9 Archiving

All data and study documents will be archived in accordance with the SOP's of the Test Facility.

- Archived data and documents will be retained for a period from the issue of the final report, in accordance with the local national regulatory requirements (determined by the country of origin of the Study Director).
- Study specific documents will be stored in the GLP Archives listed below.
- Facility-based records and documentation of QA of the involved test sites will be stored in the respective GLP Archives according to the applicable national regulations.
- A sample of the test item will be stored in the dedicated archive at the test facility.

At least the following documents will be archived:

Document or material	Location of GLP Archive	Original/Copy
Study plan and amendments	Test Facility	Original
Raw data	Test Facility	Original
Final report (and report amendments)	Test Facility	Original

At the end of the archiving period study-specific data or material will **NOT** be disposed of without the prior written consent of the Sponsor.

10 References

- OECD (1998): OECD Principles on Good Laboratory Practice (as revised in 1997). OECD Series on Principles of Good Laboratory Practice and Compliance Monitoring. ENV/MC/CHEM(98)17.
- OECD 209 (2010): OECD Guidelines for Testing of Chemicals No. 209. Activated Sludge, Respiration Inhibition Test (Carbon and Ammonium Oxidation). Adopted: 22 July 2010.
- SAS INSTITUTE INC. (2002-2010): SAS® Proprietary Software 9.3; Cary, NC, USA.

11 Appendix

Appendix 1 Main Test: Individual Values

Table 6: Oxygen content [mg O₂/L], 3 hours, total oxygen uptake

Time [min]	Control			Conc. test item [mg/L]			Conc. DCP [mg/L]			
				100	100	100	0.2	1	5	25
	O ₂ -concentration [mg/L]									
0.0	-	7.69	-	-	-	-	7.66	8.29	8.08	-
0.5	7.21	7.39	6.37	-	7.44	-	7.41	8.08	7.89	-
1.0	6.93	7.09	6.12	7.38	7.15	4.76	7.09	7.85	7.57	9.13
1.5	6.70	6.79	5.92	7.11	6.85	4.44	6.81	7.60	7.37	9.09
2.0	6.39	6.48	5.70	6.84	6.54	4.12	6.52	7.38	7.17	9.06
2.5	6.08	6.15	5.47	6.56	6.22	3.79	6.23	7.15	6.97	9.03
3.0	5.77	5.83	5.24	6.27	5.90	3.46	5.95	6.92	6.76	8.99
3.5	5.46	5.52	5.00	5.99	5.60	3.13	5.66	6.69	6.55	8.96
4.0	5.14	5.21	4.77	5.71	5.30	2.80	5.36	6.46	6.34	8.92
4.5	4.84	4.89	4.53	5.42	4.99	2.47	5.07	6.22	6.14	8.89
5.0	4.52	4.58	4.29	5.13	4.68	2.15	4.79	5.99	5.93	-
5.5	-	4.26	4.04	4.85	-	1.82	-	5.75	-	-
6.0	-	-	-	-	-	1.50	-	5.53	-	-
6.5	-	-	-	-	-	1.20	-	-	-	-

Table 6 (continued): Oxygen content [mg O₂/L], 3 hours, total oxygen uptake, abiotic control

Time [min]	Abiotic Control		
	O ₂ -concentration [mg/L]		
0.0	9.17	9.35	9.39
0.5	9.20	9.34	9.39
1.0	9.18	9.35	9.39
1.5	9.21	9.35	9.38
2.0	9.21	9.35	9.38
2.5	9.21	9.35	9.39
3.0	9.20	9.35	9.39
3.5	9.20	9.35	9.38
4.0	9.21	9.34	9.39
4.5	9.21	9.24	9.39
5.0	9.22	9.34	9.38
5.5	9.20	-	9.39

Appendix 2 pH measurements

Table 7: pH values in the test solutions of the main test

Test assay [mg/L]	pH
Control (1)	7.25
Control (2)	7.21
Control (3)	7.24
100 (1)	6.88*
100 (2)	6.79*
100 (3)	6.68*
DCP 0.2	7.27
DCP 1	7.34
DCP 5	7.21
DCP 25	7.21
Abiotic control (1)	6.38*
Abiotic control (2)	6.44*
Abiotic control (3)	6.38*

* The pH fell below 7.0 due to the test substance

Appendix 3 Certificates

Eurofins Agroscience Services EcoChem GmbH · Eutinger Str. 24 · D-75223 Niefern-Öschelbronn

CERTIFICATE OF ANALYSIS

Sample: **ANO**

Active ingredient: Ammonium Niobium Oxalate

Batch No.: AD/4663

Sponsor: CBMM Europe BV

Analysis date: 04 November 2013

Expiration date: 25 March 2015*

Assay: The content of ANO was determined as Niobium by ICP-MS. Niobium was quantified using a certified reference item as external standard and as internal standard Indium was used. The mass of 93 (Niobium) was used for quantification.

This study has been performed in compliance with the principles of Good Laboratory Practice.

The determination of the active ingredient is given in study S13-04815.

Result: **ANO: 99.4 % (w/w)**
(Mean of 6 determinations, RSD: 1.30 %)

*: according to sponsor's information

Niefern, March 27, 2014



Christina Wild, M.Sc.

Managing Director:
Dr. Martin Feyerabend
Nikolaus Kögler

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Bank Details:

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Bank Code: 250 500 00
Account No.: 150 778 512
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<http://www.eurofins.com/agroscienceservices>

Figure 2: Certificate of analysis of the test item



Baden-Württemberg

LANDESANSTALT FÜR UMWELT, MESSUNGEN UND NATURSCHUTZ BADEN-WÜRTTEMBERG

Gute Laborpraxis / Good Laboratory Practice

GLP-Bescheinigung / Statement of GLP Compliance

(gemäß / according to § 19 b Chemikaliengesetz)

Eine GLP-Inspektion zur Überwachung der Einhaltung der GLP-Grundsätze gemäß Chemikaliengesetz bzw. Richtlinie 2004/9/EG wurde durchgeführt in:

Assessment of conformity with GLP according to Chemikaliengesetz and Directive 2004/9/EC at:

☒ Prüfeinrichtung / Test facility

☐ Prüfstandort / Test site

Eurofins Agroscience Services EcoChem GmbH

Eutinger Straße 24

75223 Niefern-Öschelbronn

(Unverwechselbare Bezeichnung und Adresse / Unequivocal name and address)

Prüfungen nach Kategorien / Areas of Expertise

(gemäß / according ChemVwV-GLP Nr. 5.3 / OECD guidance)

1 Prüfungen zur Bestimmung der physikalisch-chemischen Eigenschaften	Physical-chemical testing
4 Ökotoxikologische Prüfungen zur Bestimmung der Auswirkungen auf aquatische und terrestrische Organismen	Environmental toxicity studies on aquatic and terrestrial organisms
5 Prüfungen zum Verhalten im Boden, im Wasser und in der Luft; Prüfungen zur Bioakkumulation und zur Metabolisierung	Studies on behavior in water, soil and air; bioaccumulation
6 Prüfungen zur Bestimmung von Rückständen	Residue studies
7 Prüfungen zur Bestimmung der Auswirkungen auf Mesokosmen und natürliche Ökosysteme	Studies on effects on mesocosms and natural ecosystems
8 Analytische Prüfungen an biologischen Materialien	Analytical and clinical chemistry testing

Datum der Inspektion / Date of Inspection

(Tag, Monat, Jahr / day, month, year)

10.10.2013

Die/Der genannte Prüfeinrichtung/Prüfstandort befindet sich im nationalen GLP-Überwachungsverfahren und wird regelmäßig auf Einhaltung der GLP-Grundsätze überwacht.

The above mentioned test facility/test site is included in the national GLP Compliance Programme and is inspected on a regular basis.

Auf der Grundlage des Inspektionsberichtes wird hiermit bestätigt, dass in dieser Prüfeinrichtung/diesem Prüfstandort die oben genannten Prüfungen unter Einhaltung der GLP-Grundsätze durchgeführt werden können.

Based on the inspection report it can be confirmed, that this test facility/test site is able to conduct the aforementioned studies in compliance with the Principles of GLP.

Unterschrift, Datum, Signatur, Date

Volker Giraud

Dr. Volker Giraud

Leiter der Abteilung Technischer Umweltschutz



Karlsruhe, 08.01.2014

(Name und Funktion der verantwortlichen Person / Name and function of responsible person)

LUBW Landesanstalt für Umwelt, Messungen und Naturschutz Baden-Württemberg
Postfach 10 01 63, 76231 Karlsruhe

(Name und Adresse der GLP-Überwachungsbehörde / Name and address of GLP Monitoring Authority)

Figure 3: GLP certificate of the testing facility