

ENVIROTEK LABORATORIES, INC.

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PHONE 856-478-0010 www.enviroteklab.com
EPA ID # NJ01298 NJ DEP ID # 08012

H₂O TECHNOLOGIES CHEMICAL REDUCTION TEST REPORT

Report # 13-345 (Purinize)
Report Date: 10/31/2013
Customer Name: H₂O Technologies, Inc.

EXECUTIVE SUMMARY

Six different batches of challenge water prepared with mixes of Pesticides, Semivolatile Organic Compounds, Basic Drugs, Pharmaceutical Drugs, Herbicides, and Fungicides at concentrations stated by NSF Standard 53 (when applicable) for each compound were treated with H₂O Technologies, Inc. Purinize for 24 hours and then filtered through H₂O Technologies, Inc. Filter System. The challenge water and the filtered water were analyzed using approved EPA methods of analysis (when applicable) and reported to determine the effectiveness of the H₂O Technologies, Inc. Purinize treatment and filter system removing these contaminants.

INTRODUCTION

Six different batches of challenge water prepared with mixes of Pesticides, Semivolatile Organic Compounds, Basic Drugs, Pharmaceutical Drugs, Herbicides, and Fungicides at concentrations stated by NSF Standard 53 (when applicable) for each compound were treated with H₂O Technologies, Inc. Purinize for 24 hours and then filtered through H₂O Technologies, Inc. Filter System. The challenge water and the filtered water were analyzed using approved EPA methods of analysis (when applicable) and reported to determine the effectiveness of the H₂O Technologies, Inc. Purinize treatment and filter system removing these contaminants. The procedures and results are summarized as follows.

REAGENTS, MATERIALS, AND LAB EQUIPMENT

Hewlett Packard GC/MS 5890/5972.
Hewlett Packard GC/ECD 5890.
DI water ASTM reagent type 3.
Restek Semivolatile, Pesticides, Basic Drugs, Pharmaceuticals, Herbicides, Fungicides Standards.
H₂O Technologies, Inc. Purinize.
H₂O Technologies, Inc. Filter System.

PROCEDURE

Challenge Water preparation:

The Pesticides challenge water was prepared by adding an aliquot of the Restek standard to 1 liter of water to get a concentration of about 50 µg/L for each compound (except for some specific compounds). Added 2 mL of H₂O Technologies, Inc. Purinize to the challenge water and let it sit for 24 hours. Passed the challenge water through the H₂O Technologies, Inc. Filter System, collected a filtered water sample and tested it for Pesticides along with the challenge water sample using the EPA method 508.

The Semivolatiles challenge water was prepared by adding an aliquot of the Restek standard to 1 liter of water to get a concentration of about 50 µg/L for each compound. Added 2 mL of H₂O Technologies, Inc. Purinize to the challenge water and let it sit for 24 hours. Passed the challenge water through the H₂O Technologies, Inc. Filter System, collected a filtered water sample and tested it for Semivolatiles along with the challenge water sample using the EPA method 525.

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The Basic Drugs challenge water was prepared by adding an aliquot of the Restek standard to 1 liter of water to get a concentration of about 20 µg/L for each compound. Added 2 mL of H₂O Technologies, Inc. Purinize to the challenge water and let it sit for 24 hours. Passed the challenge water through the H₂O Technologies, Inc. Filter System, collected a filtered water sample and tested it for Pesticides along with the challenge water sample using Standard GC/MS Methods of Analysis.

The Pharmaceuticals challenge water was prepared by adding an aliquot of the Restek standard to 1 liter of water to get a concentration of about 20 µg/L for each compound. Added 2 mL of H₂O Technologies, Inc. Purinize to the challenge water and let it sit for 24 hours. Passed the challenge water through the H₂O Technologies, Inc. Filter System, collected a filtered water sample and tested it for Pharmaceuticals along with the challenge water sample using Standard GC/MS Methods of Analysis.

The Herbicides challenge water was prepared by adding an aliquot of the Restek standard to 1 liter of water to get a concentration of about 150 µg/L for each compound (except for some specific compounds). Added 2 mL of H₂O Technologies, Inc. Purinize to the challenge water and let it sit for 24 hours. Passed the challenge water through the H₂O Technologies, Inc. Filter System, collected a filtered water sample and tested it for Pesticides along with the challenge water sample using the EPA method 515.

The Fungicides challenge water was prepared by adding an aliquot of the Restek standard to 1 liter of water to get a concentration of about 20 µg/L for each compound. Added 2 mL of H₂O Technologies, Inc. Purinize to the challenge water and let it sit for 24 hours. Passed the challenge water through the H₂O Technologies, Inc. Filter System, collected a filtered water sample and tested it for Fungicides along with the challenge water sample using Standard GC/MS Methods of Analysis.

RESULTS

Table 1
Pesticides Influent Water Properties

Parameter	Influent Water	NSF/ANSI Standard 53 Target (Section 7.2.1.5)
pH	7.60	7.50±0.5
Temperature	19.0	20±3°C
TDS	220 mg/L	200 to 500 mg/L
TOC	1.6 mg/L	>1.0 mg/L
Turbidity	0.55	<1 NTU

Table 2
Pesticides Effluent Water Test Results

Pesticides Parameter	Influent Water Concentration in µg/L	H ₂ O Technologies, Inc. Purinize Filter System Effluent Concentration in µg/L	% Reduction
4,4'-DDD	50.1	10.5	79.0
4,4'-DDE	50.0	9.5	81.0
4,4'-DDT	50.2	9.4	81.3
Alachlor	40.1	8.5	78.8
Aldrin	50.2	10.5	79.1
Alpha-BHC	49.8	9.8	80.3
Ametryn	50.0	10.1	79.8
Atraton	51.3	10.2	80.1
Atrazine	9.0	<0.5	99.9
Beta-BHC	49.2	7.5	84.8
Bromacil	51.0	9.4	81.6
Carbofuran	80.2	2.5	96.9
Chlordane	40.1	3.2	92.0
Chlorneb	51.0	10.7	79.0
Chlorobenzilate	49.5	9.5	80.8
Chlorothalonil	50.1	7.1	85.8
Chlorprophane	51.5	6.5	87.4
Chlorpyrifos	51.4	8.5	83.5
Cyanizene	51.0	8.8	82.7

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Pesticides Parameter	Influent Water Concentration in µg/L	H ₂ O Technologies, Inc. Purinize Filter System Effluent Concentration in µg/L	% Reduction
Delta-BHC	50.1	7.3	85.4
Dichlorvos	50.1	7.5	85.0
Dieldrin	49.4	8.6	82.6
Diphenamid	51.2	8.4	83.6
Disulfoton	50.1	9.8	80.4
Endosulfan Sulfate	51.1	8.6	83.2
Endrin	6.1	<0.5	99.9
Endrin Aldehyde	51.2	10.5	79.5
Endrin Ketone	52.1	10.3	80.2
Endosulfan I	49.8	11.6	76.7
Endosulfan II	50.2	10.8	78.5
Ethoprop	50.2	10.7	78.7
Fenamiphos	51.2	10.6	79.3
Fenarimol	50.2	8.9	82.3
Fluoridone	51.4	9.7	81.1
Gamma-BHC (Lindane)	2.1	<0.2	90.5
Heptachlor	79	<0.4	99.5
Heptachlor Epoxide	4.2	<0.2	95.2
Methoxychlor	120	<0.5	95.1
Molinate	50.6	2.5	85.0
PCB's	10.0	1.5	94.8
Prometron	50.2	2.6	76.9
Simazine	12.1	2.8	76.8
Toxaphene	15.1	3.5	93.2

Table 3
Semivolatiles Influent Water Properties

Parameter	Influent Water	NSF/ANSI Standard 53 Target (Section 7.2.1.5)
pH	7.40	7.50±0.5
Temperature	19.5	20±3°C
TDS	280 mg/L	200 to 500 mg/L
TOC	1.8 mg/L	>1.0 mg/L
Turbidity	0.75	<1 NTU

Table 4
Semivolatiles Effluent Water Test Results

Semivolatiles Parameter	Influent Water Concentration in µg/L	H ₂ O Technologies, Inc. Purinize Filter System Effluent Concentration in µg/L	% Reduction
Acenaphthylene	50.1	3.4	88.5
Anthracene	50.3	5.8	86.7
Benz[a]anthracene	51.3	6.8	84.5
Benzo[b]fluoranthene	50.4	7.8	82.9
Benzo[k]fluoranthene	49.8	8.5	81.3
Benzo[a]pyrene	51.4	9.6	86.4
Benzo[g,h,i]perylene	50.0	6.8	88.5
Butylbenzylphthalate	50.5	5.8	85.3
Carboxin	50.2	7.4	89.5
2-Chlorobiphenyl	50.7	5.3	95.1
Chrysene	51.1	2.3	95.5
Cycloate	51.8	3.5	93.2
Dacthal (DCPA)	51.2	2.8	94.5
Diazinon	52.0	3.6	93.1
Dibenz[a,h]anthracene	51.4	3.7	92.8
Di-n-Butylphthalate	49.5	5.4	89.1
2,3-Dichlorobiphenyl	50.4	5.6	88.9
Diethylphthalate	49.0	6.5	86.7
Di(2-ethylhexyl)adipate	50.1	4.7	99.9
Di(2-ethylhexyl)phthalate	52.0	5.6	89.2
Dimethylphthalate	51.0	6.8	86.7
2,4-Dinitrotoluene	50.5	6.4	87.3
2,6-Dinitrotoluene	49.8	6.1	87.8

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Semivolatiles Parameter	Influent Water Concentration in µg/L	H ₂ O Technologies, Inc. Purinize Filter System Effluent Concentration in µg/L	% Reduction
EPTC	51.3	2.5	95.1
Fluorene	49.8	3.5	93.0
2,2', 3,3', 4,4', 6-Heptachlorobiphenyl	50.8	4.5	91.1
Hexachlorobenzene	51.4	5.2	89.9
2,2', 4,4', 5,6'-Hexachlorobiphenyl	51.2	3.6	93.0
Hexachlorocyclohexane, alpha	51.2	3	94.1
Hexachlorocyclohexane, beta	50.2	2.5	95.0
Hexachlorocyclohexane, delta	50.5	3.5	93.1
Hexachlorocyclopentadiene	49.2	3.6	92.7
Hexazinone	51.4	4.5	91.2
Indeno[1,2,3,c,d]pyrene	51.2	4.2	91.8
Isophorone	51.1	4.1	92.0
Merphos	51.3	2.5	99.9
Methyl Paraoxon	50.0	2.8	94.4
MGK	50.2	2.9	94.2
Napropamide	49.5	2.7	94.5
Norflurazon	50.1	2.5	95.0
2,2', 3,3', 4,5', 6,6'-Octachlorobiphenyl	50.5	2.6	94.9
Pebulate	50.1	2.4	95.2
2,2', 3', 4,6'-Pentachlorobiphenyl	49.5	2.5	94.9
Pentachlorophenol	51.2	2.3	95.5
Phenanthrene	51.0	2.5	95.1
cis-Permethrin	50.0	2.4	95.2
trans-Permethrin	50.4	2.5	95.0
Prometon	50.1	2.6	94.8
Prometryn	48.8	2.8	94.3
Pronamide	48.5	2.9	94.0
Propachlor	48.8	2.7	94.5
Propazine	51.1	2.8	94.5
Triademefon	50.2	2.3	95.4
2,4,5-Trichlorobiphenyl	51.1	2.3	95.5
Tricyclazole	51.8	3.5	93.2
Trifluralin	51.2	2.8	94.5
Vernolate	52.0	3.6	93.1

Table 5
Herbicides Influent Water Properties

Parameter	Influent Water	NSF/ANSI Standard 53 Target (Section 7.2.4.5)
pH	7.75	7.50±0.5
Temperature	20.5	20±3°C
TDS	330 mg/L	200 to 500 mg/L
TOC	1.3 mg/L	>1.0 mg/L
Turbidity	0.85	<1 NTU

Table 6
Herbicides Effluent Water Test Results

Herbicide Parameter	Influent Water Concentration in µg/L	H ₂ O Technologies, Inc. Purinize Filter System Effluent Concentration in µg/L	% Reduction
Dalapon	151	<0.1	99.9
Dicamba	150	<0.1	99.9
Dinosep	22.5	<0.1	99.0
Dichlorporp	150	<0.1	99.9
2,4-D	220	<0.5	99.9
Pentachlorophenol	10.1	<0.5	99.9
Picoram	150	<0.5	99.9
2,4,5-T	152	<0.5	99.9
2,4,5-TP (Silvex)	148	<0.5	99.9
2,4-DB	151	<0.5	99.9
Bentazom	150	<0.5	99.9
DCPA	150	<0.5	99.9
Quinclorac	152	<0.5	99.9

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Herbicide Parameter	Influent Water Concentration in µg/L	H ₂ O Technologies, Inc. Purinize Filter System Effluent Concentration in µg/L	% Reduction
Aciflurfen	152	<0.5	99.9

Table 7

Pharmaceutical Drugs Influent Water Properties

Parameter	Influent Water	NSF/ANSI Standard 53 Target (Section 7.2.4.5)
pH	7.45	7.50±0.5
Temperature	18.5	20±3°C
TDS	380 mg/L	200 to 500 mg/L
TOC	1.4 mg/L	>1.0 mg/L
Turbidity	0.80	<1 NTU

Table 8

Pharmaceutical Drugs Effluent Water Test Results

Pharmaceutical Drugs Parameter	Influent Water Concentration in µg/L	H ₂ O Technologies, Inc. Purinize Filter System Effluent Concentration in µg/L	% Reduction
Acetaminofen	21.0	<0.1	99.5
Caffeine	20.1	<0.1	99.5
Carbamazepine	21.3	<0.1	99.5
Ciprofloxacin HCl	21.2	<0.1	99.5
Erythromycin USP	20.0	<0.1	99.5
Sulfamethoxazole	21.4	<0.1	99.5
Trimethoprim	21.3	<0.1	99.5
Bisphenol A	20.5	<0.1	99.5
Diclofenac Sodium	20.4	<0.1	99.5
4-para-Nonylphenol	20.8	<0.1	99.5
4-tert-Octylphenol	21.4	<0.1	99.5
Primidone	20.9	<0.1	99.5
Progesterone	20.4	<0.1	99.5
Gemfibrozil	21.4	<0.1	99.5
Ibuprofen	21.3	<0.1	99.5
Naproxen Sodium	20.7	<0.1	99.5
Triclosan	20.8	<0.1	99.5

Table 9

Basic Drugs Influent Water Properties

Parameter	Influent Water	NSF/ANSI Standard 53 Target (Section 7.2.4.5)
pH	7.45	7.50±0.5
Temperature	18.5	20±3°C
TDS	380 mg/L	200 to 500 mg/L
TOC	1.4 mg/L	>1.0 mg/L
Turbidity	0.80	<1 NTU

Table 10

Basic Drugs Effluent Water Test Results

Basic Drugs Parameter	Influent Water Concentration in µg/L	H ₂ O Technologies, Inc. Purinize Filter System Effluent Concentration in µg/L	% Reduction
Nicotine	20.2	<0.1	99.5
Benzocaine	21.1	<0.1	99.5
Cotinine	21.5	<0.1	99.5
Mepertine	20.6	<0.1	99.5
Caffeine	20.8	<0.1	99.5
Benzphetamine	20.5	<0.1	99.5
Ketamine	20.2	<0.1	99.5
Diphenhydramine	19.9	<0.1	99.5
Lidocaine	19.8	<0.1	99.5
Pheniltoloxamine	20.5	<0.1	99.5
Tripeleannamine	19.7	<0.1	99.5
Phenothiazine	19.8	<0.1	99.5
Dextromethorphan	20.2	<0.1	99.5

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Basic Drugs Parameter	Influent Water Concentration in µg/L	H ₂ O Technologies, Inc. Purinize Filter System Effluent Concentration in µg/L	% Reduction
Amitriptyline	19.8	<0.1	99.5
Tetracaine	19.6	<0.1	99.5
Codeine	20.5	<0.1	99.5
Morphine	20.8	<0.1	99.5
Diazepam	20.4	<0.1	99.5
Nicotine	20.2	<0.1	99.5

Table 11
Fungicide Influent Water Properties

Parameter	Influent Water	NSF/ANSI Standard 53 Target (Section 7.2.4.5)
pH	7.45	7.50±0.5
Temperature	18.7	20±3°C
TDS	390 mg/L	200 to 500 mg/L
TOC	1.4 mg/L	>1.0 mg/L
Turbidity	0.75	<1 NTU

Table 12
Fungicide Effluent Water Test Results

Fungicide Parameter	Influent Water Concentration in µg/L	H ₂ O Technologies, Inc. Purinize Filter System Effluent Concentration in µg/L	% Reduction
Allyl Alcohol	20.1	<0.1	99.5
2-Phenylphenol	20.5	<0.1	99.5
Biphenol	20.6	<0.1	99.5
Dichloroan	20.1	<0.1	99.5
Dinopenton	20.8	<0.1	99.5
Etridiazole	21.4	<0.1	99.5

Jaime Young

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