

# CERTIFICATE OF ANALYSIS

 CERTIFICATE NO. 2018090501

PRODUCT	: AstaZine® Astaxanthin-Enriched <i>Haematococcus pluvialis</i> Powder 5%		
PRODUCT NO.	: SDHP-05	DATE OF MANUFACTURE	: Jul. 22, 2018
LOT NO. EXPIRY	: 180708 SDHP-05	DATE OF CERTIFICATE	: Jul. 30, 2018
DATE	: Jul. 21, 2020	SPECIFICATION NO.	: 100

ANALYSIS ITEMS	SPECIFICATIONS	TEST METHOD	RESULTS
CHARACTERISTICS	Dark red powder	Visual inspection	CONFORMS
※CADMIUM	0.05ppm Max.	Eur. Ph. 2.4.27	CONFORMS
※LEAD	0.3ppm Max.	Eur. Ph. 2.4.27	CONFORMS
※MERCURY	0.05ppm Max.	Eur. Ph. 2.4.27	CONFORMS
※ARSENIC	0.3ppm Max.	Eur. Ph. 2.4.27	CONFORMS
LOSS ON DRYING	5.0% Max.	Eur. Ph. 2.8.17	3.7%
ASTAXANTHIN: Content of Astaxanthin by HPLC (on dry basis)	5.0% Min.	USP 38 monograph	5.5%
MICROBIOLOGY		Eur. Ph. 2.6.12 and 2.6.13	
TOTAL PLATE COUNT	< 10,000cfu /g		CONFORMS
YEAST & MOLD	< 1,000cfu /g		CONFORMS
BILE-TOLERANT GRAM-NEGATIVE BACTERIA	< 100cfu/g		CONFORMS
E.COLI	Negative/g		CONFORMS
SALMONELLA	Negative/10g		CONFORMS

※Periodic test (not carried out batch by batch) for which BGG tests batches randomly every year.

 QUALITY CONTROL MANAGER *xyhwa*

 CHECK *jf yao*

 ANALYST *wg sun*

Certificate ID: **51285**

 Received: **3/25/19**

 Scan QR Code  
 for authenticity

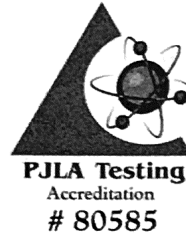
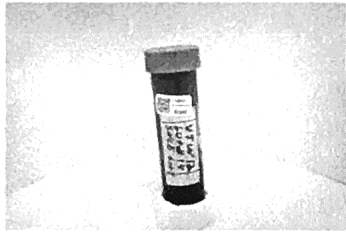
**Sustainable Aquatics**
**110 W Old Andrew Johnson Hwy**
**Jefferson City, TN 37760**
**Attn: Matthew Carberry**

 Client Sample ID: **VTW12**

 Lot Number: **14**

 Matrix: **Concentrates/Extracts - Rick Simpson Oil**

Authorization: <b>Jon Podgorni, Lab Manager</b>	Signature: 	Date: <b>4/19/2019</b>
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The data contained within this report was collected in accordance with the requirements of ISO/IEC 17025:2005. I attest that the information contained within the report has been reviewed for accuracy and checked against the quality control requirements for each method. These results relate only to the test article listed in this report. Reports may not be reproduced except in their entirety.

**CN: Cannabinoid Profile & Potency [WI-10-17 & WI-10-17-01]**

 Analyst: **LG**

 Test Date: **4/3/2019**

The client sample was analyzed for plant-based cannabinoids by Liquid Chromatography (LC). The collected data was compared to data collected for certified reference standards at known concentrations.

**51285-CN**

ID	Weight %	Concentration		
D9-THC	1.57 wt %	15.69 mg/g		
THCV	ND	ND		
CBD	38.24 wt %	382.45 mg/g		
CBDV	ND	ND		
CBG	0.73 wt %	7.31 mg/g		
CBC	1.83 wt %	18.31 mg/g		
CBN	0.10 wt %	1.05 mg/g		
THCA	ND	ND		
CBDA	0.14 wt %	1.45 mg/g		
CBGA	ND	ND		
D8-THC	ND	ND		
exo-THC	ND	ND		
<b>Total</b>	<b>42.63 wt%</b>	<b>426.26 mg/g</b>	<b>0%</b>	<b>Cannabinoids (wt%) 38.2%</b>
<b>Max THC</b>	<b>1.57 wt%</b>	<b>15.69 mg/g</b>		
<b>Max CBD</b>	<b>38.37 wt%</b>	<b>383.71 mg/g</b>		

**Ratio of Total CBD to THC 24.5:1**

Max THC (and Max CBD) are calculated values for total cannabinoids after heating, assuming complete decarboxylation of the acid to the neutral form. It is calculated based on the weight loss of the acid group during decarboxylation:  $\text{Max THC} = (0.877 \times \text{THCA}) + \text{THC}$ . This calculation does not include other cannabinoid isomers (eg. D8-THC and exo-THC). ND = None detected above the limits of detection (LLD)

**EA: Elemental Analysis [WI-10-13]**

Analyst: JFD

Test Date: 4/2/2019

This test method was performed in accordance with the requirements of ISO/IEC 17025. These results relate only to the test article listed in this report. Reports may not be reproduced except in their entirety.

**51285-EA**

Symbol	Metal	Conc. <sup>1</sup>	MDL	Limits <sup>2</sup>	Status
Al	Aluminum	447 ug/kg	5 ug/kg	-	
As	Arsenic	58 ug/kg	4 ug/kg	150 ug/kg	PASS
Cd	Cadmium	3 ug/kg	1 ug/kg	2500 ug/kg	PASS
Ca	Calcium	36,736 ug/kg	500 ug/kg	-	
Cr	Chromium	255 ug/kg	5 ug/kg	-	
Co	Cobalt	38 ug/kg	10 ug/kg	-	
Cu	Copper	4,723 ug/kg	500 ug/kg	100000 ug/kg	PASS
Fe	Iron	21,153 ug/kg	5 ug/kg	-	
Pb	Lead	15 ug/kg	2 ug/kg	500 ug/kg	PASS
Mg	Magnesium	ND	500 ug/kg	-	
Mn	Manganese	898 ug/kg	500 ug/kg	-	
Hg	Mercury	ND	2 ug/kg	1500 ug/kg	PASS
Mo	Molybdenum	ND	5000 ug/kg	10000 ug/kg	PASS
Ni	Nickel	ND	500 ug/kg	50000 ug/kg	PASS
P	Phosphorus	ND	500 ug/kg	-	
K	Potassium	ND	5 ug/kg	-	
Se	Selenium	ND	10 ug/kg	-	
Ag	Silver	ND	10 ug/kg	-	
S	Sulfur	ND	5 ug/kg	-	
Sn	Tin	ND	5000 ug/kg	-	
Zn	Zinc	12,942 ug/kg	5 ug/kg	-	

1) ND = None detected to the Method Detection Limit (MDL)

2) USP recommended maximum daily limits for oral drug product.

**MB1: Microbiological Contaminants [WI-10-09]**

Analyst: MM

Test Date: 3/26/2019

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**51285-MB1**

Symbol	Analysis	Results	Units	Limits*	Status
AC	Total Aerobic Bacterial Count	<100	CFU/g	10,000 CFU/g	PASS
CC	Total Coliform Bacterial Count	<100	CFU/g	100 CFU/g	PASS
EB	Total Bile Tolerant Gram Negative Count	<100	CFU/g	100 CFU/g	PASS
YM	Total Yeast & Mold	<100	CFU/g	1,000 CFU/g	PASS

Note: All recorded Microbiological tests are within the established limits.

**MB2: Pathogenic Bacterial Contaminants [WI-10-10]**

Analyst: LabAdmin

Test Date: 3/27/2019

This test method was performed in accordance with the requirements of ISO/IEC 17025. These results relate only to the test article listed in this report. Reports may not be reproduced except in their entirety.

**51285-MB2**

Test ID	Analysis	Results	Units	Limits*	Status
51285-ECPT	E. coli (O157)	Negative	NA	Non Detected	PASS
51285-SPT	Salmonella	Negative	NA	Non Detected	PASS

Note: All recorded pathogenic bacteria tests passed.

**MY: Mycotoxin Testing [WI-10-05]**

Analyst: CJB

Test Date: 3/28/2019

This test method was performed in accordance with the requirements of ISO/IEC 17025. These results relate only to the test article listed in this report. Reports may not be reproduced except in their entirety.

**51285-MY**

Test ID	Date	Results	MDL	Limits	Status*
Total Aflatoxin	3/28/2019	< MDL	2 ppb	< 20 ppb	PASS
Total Ochratoxin	3/28/2019	< MDL	3 ppb	< 20 ppb	PASS

**PST: Pesticide Analysis [WI-10-11]**

Analyst: RAS

Test Date: 4/19/2019

The client sample was analyzed for pesticides using Liquid Chromatography with Mass Spectrometric detection (LC/MS/MS). The method used for sample prep was based on the European method for pesticide analysis (EN 15662).

**51285-PST**

Analyte	CAS	Result	Units	LLD	Limits (ppb)	Status
Abamectin B1a	65495-55-3	ND	ppb	0.20	300	*
Abamectin B1b	65195-56-4	ND	ppb	0.20	300	*
Azoxystrobin	131860-33-8	ND	ppb	0.10	40000	PASS
Bifenazate	149877-41-8	ND	ppb	0.10	5000	PASS
Bifenthrin	82657-04-3	ND	ppb	0.20	500	PASS
Cyfluthrin	68359-37-5	ND	ppb	0.50	1000	*
Daminozide	1596-84-5	ND	ppb	10.00	10	PASS
Etoxazole	153233-91-1	ND	ppb	0.10	1500	PASS
Fenoxycarb	72490-01-8	ND	ppb	0.10	10	PASS
Imazalil	35554-44-0	ND	ppb	0.10	10	PASS
Imidacloprid	138261-41-3	ND	ppb	0.10	3000	PASS
Myclobutanil	88671-89-0	ND	ppb	0.10	9000	PASS
Paclotrazol	76738-62-0	ND	ppb	0.10	10	PASS
Piperonyl butoxide	51-03-6	ND	ppb	0.10	8000	PASS
Pyrethrin	8003-34-7	ND	ppb	0.1	1000	*
Spinosad	168316-95-8	14	ppb	0.1	3000	PASS
Spiromesifen	283594-90-1	ND	ppb	0.10	12000	*
Spirotetramat	203313-25-1	ND	ppb	0.10	13000	PASS
Trifloxystrobin	141517-21-7	ND	ppb	0.10	30000	PASS

\* Testing limits for ingestion established by the State of California: CCR, Title 16, Division 42, Chapter 5, Section 5313. ND indicates "none detected" above the lower limit of detection (LLD). Analytes marked with (\*) indicate analytes for which no recovery was observed for a pre-spiked matrix sample.

The client sample was analyzed by Head-Space Gas Chromatography (HS-GC). The collected data was compared to data collected for certified reference standards at known concentrations. All values are qualitative based on recorded peak areas

51285-TP

Compound	wt%	Quantitative Profile	Compound	wt%	Quantitative Profile
isopulegol			beta-caryophyllene	0.231	
menthol*			beta-pinene		
linalool	0.012		delta-3-carene		
caryophyllene oxide	0.022		L-fenchone*		
guaiol	0.068		beta-myrcene		
Sabinene*			alpha-phellandrene*		
p-cymene			alpha-ocimene		
Camphene			D-limonene		
eucalyptol			cis-beta-ocimene		
geraniol			gamma-terpinene		
terpinolene			alpha-humulene	0.074	
alpha-bisabolol	0.092		cis-nerolidol		
alpha-pinene			trans-nerolidol		
alpha-terpinene					
wt% 0.00		0.25	0.50	0.00 0.25 0.50	
Total Terpene: 0.5 wt%					

VC: Analysis of Volatile Organic Compounds [WI-10-07]

The client sample was analyzed by Head-Space Gas Chromatography (HS-GC). The collected data was compared to data collected for certified reference standards at known concentrations.

51285-VC

Compound	CAS	Amount <sup>1</sup>	Limit <sup>2</sup>	RL	Status
Propane	74-98-6	ND	1,000 ppm	2	PASS
Isobutane	75-28-5	ND	1,000 ppm	2	PASS
Butane	106-97-8	ND	1,000 ppm	2	PASS
Methanol	67-56-1	378 ppm	3,000 ppm	20	PASS
Ethanol	64-17-5	37,040 ppm	5,000 ppm	20	FAIL
Acetone	67-64-1	94 ppm	1,000 ppm	20	PASS
Isopropanol	67-63-0	ND	5,000 ppm	20	PASS
Acetonitrile	75-05-8	ND	410 ppm	20	PASS
Hexane	110-54-3	ND	290 ppm	20	PASS
Ethyl Acetate	141-78-6	298 ppm	5,000 ppm	20	PASS
Heptane	142-82-5	ND	5,000 ppm	20	PASS

1) ND = Not detected at a level greater than the Reporting Limit (RL).

2) In ppm, based on USP recommended limits for residual solvents, adopted by the Massachusetts Department of Public Health on 3/31/16. Butane/Propane limits are based on limits established for state of Colorado.

END OF REPORT