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40 West Louise Ave., Salt Lake City, UT 84115
Phone: (801) 485-1800 Fax: (801) 484-9211
Email: utlab@advancedlabsinc.com
FDA Registration #3006423386

Test Certificate

Description: D-Glucosamine Hydrochloride (40 Mesh)
Sample ID: GE170103
Lot No:
Part Code:
Location:
PO No:
Received: 11/2/2017

Client: Mid-West Nutrition
925 W 6th St
Fremont, NE 68025

Lab No: 143819-01
Completed: 11/9/2017

Analysis	Result	Per Unit	Method
†D-Glucosamine HCl	99.84	%	HPLC

D-Glucosamine HCl analysis performed using HPLC by method adapted from Liang ZM, Leslie J, Adebowale A, Ashraf M, Eddington ND, "Determination of the nutraceutical, glucosamine hydrochloride, in raw materials, dosage forms and plasma using pre-column derivatization with ultraviolet HPLC" as published in Journal Of Pharmaceutical And Biomedical Analysis 20 (5): 807-814 Sep 1999; utilizing pre-column derivatization with phenylisothiocyanate followed by isocratic elution on a Waters Symmetry C18 3mm (250 x 4.6 mm) column with mobile phase consisting of MeOH/H2O/CH3COOH (10:89.6:0.04). Detection performed by scanning PDA (200-400nm) with signal extraction at 254nm for quantification.

Results Approved By: Shane Shupe-Technical Manager **Dated:** 11/9/2017

Tests marked with † were done at Atlas Bioscience Labs, LLC, a joint venture with Advanced Laboratories. - 1775 S. Pantano Rd - Ste #110, Tucson, AZ 85710

Printed: 11/9/2017 4:08:18 PM

TREND CHECK

MID-WEST NUTRITION

Address: 925 W 6th St., Fremont, NE 68025 **Tel:** 402-721-7347 **Fax:** 415-329-1920

Certificate of Analysis

Product Name: D-Glucosamine Hydrochloride (40 mesh)

Batch No.: GE170103 Country of Origin: P. R. China

Manufacture Date: Jan. 05, 2017 Expired Date: Jan. 04, 2020

Non-Irradiated/Non-ETO/Treat by Heat Only CAS No.: 3416-24-8

Analysis Item	Specification	Result	Method
Assay	**98.0% – 102.0%**	**99.46%**	**HPLC**
Appearance	White crystalline powder	Complies	Visual
Specific Rotation $[\alpha]^{20}_{D}$	+70.0° – +73.0°	+71.72°	USP39-NF34<781S>
Identification	Positive	Complies	USP39-NF34<197K>
pH	3.0 – 5.0	4.11	USP39-NF34<791>
Powder Size	100% through 40 mesh	Complies	USP #40 Sieve
Bulk Density	≥ 0.70 g/mL	0.73 g/mL	USP39-NF34<616>
Loss on Drying	≤ 0.5%	0.05%	USP39-NF34<731>
Residue on Ignition	≤ 0.1%	0.06%	USP39-NF34<281>
Sulfate (SO_4)	≤ 0.24%	Complies	USP39-NF34<221>
Chloride (Cl)	16.2% - 16.7%	16.47%	USP39-NF34<221>
Total Heavy Metals	≤ 10 μg/g	Complies	USP39-NF34<231>
Arsenic (As)	≤ 3.0 μg/g	0.18 μg/g	ICP-MS
Cadmium (Cd)	≤ 1.0 μg/g	ND (< 0.01 μg/g)	ICP-MS
Lead (Pb)	≤ 1.0 μg/g	0.10 μg/g	ICP-MS
Mercury (Hg)	≤ 0.1 μg/g	0.03 μg/g	ICP-MS
Total Plate Count	≤ 1,000 cfu/g	< 10 cfu/g	USP39-NF34<2021>
Molds and Yeasts	≤ 100 cfu/g	< 10 cfu/g	USP39-NF34<2021>
Salmonella	Absence	Complies	USP39-NF34<2022>
E. Coli	Absence	Complies	USP39-NF34<2022>
Staphylococcus aureus	Absence	Complies	USP39-NF34<2022>

Packing: 25 kg/drum, packing in paper-drums and two sealed plastic-bags inside.

Storage: Store in a well-closed container away from moisture, direct light and heat.

Expired date: Re-test after three years from the manufacturing date.

Conclusion: <u>Conform to Specification.</u>

Quality Assurance officer: _____ **Analyst:** _____