

ALADDIN SCIENTIFIC CORPORATION

14078 Meridian Parkway, Riverside, CA. 92518

## Certificate of Analysis

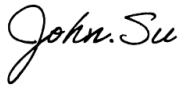
Date of Testing: 2023-01-06 18:36:57  
 Date of Next Testing: 2027-01-05 18:36:57  
 Product Name: **L-Serine**  
 CAS Number: 56-45-1  
 Specifications & Purity: Ultra Pure, ≥99.5% (NT)  
 Lot #: A2304214  
 SKU #: **S137888**  
**Analysis: 175956**

Parameter	Limit Values	Result
Sodium(Na)	0-50 (ppm)	9.00 ppm
Chromium(Cr)	0-5 (ppm)	0.00 ppm
loss on drying, 20 °C (HV)	0-0.1 (%)	0.00 %
Cadmium(Cd)	0-5 (ppm)	0.00 ppm
Barium(Ba)	0-5 (ppm)	0.00 ppm
Chloride (Cl-)	0-50 (ppm)	10.30 ppm
Specific Rotation [α] <sub>20</sub> /D(c=5 in 5 M HCl)	12.5-13 (°)	12.94°
Strontium(Sr)	0-5 (ppm)	0.00 ppm
Lithium(Li)	0-5 (ppm)	0.00 ppm
Sulfate(SO <sub>4</sub> <sup>2-</sup> )	0-50 (ppm)	0.00 ppm
Lead(Pb)	0-5 (ppm)	0.00 ppm
foreign amino acids	0-0.3 (%)	0.21 %
Molybdenum(Mo)	0-5 (ppm)	0.00 ppm
Copper(Cu)	0-5 (ppm)	0.00 ppm
UV Absorbance 260nm	0-0.05	0.03
Potassium(K)	0-50 (ppm)	12.00 ppm
(As)Arsenic	0-0.1 (ppm)	0.00 ppm
Ignition Residue (as sulfate)	0-0.1 (%)	0.00 %
Bismuth(Bi)	0-5 (ppm)	0.00 ppm
Cobalt(Co)	0-5 (ppm)	0.00 ppm
Iron(Fe)	0-5 (ppm)	0.00 ppm
Purity((NT)	99.5-100.5 (%)	100.41 %
Nickel(Ni)	0-5 (ppm)	0.00 ppm
Calcium(Ca)	0-50 (ppm)	0.00 ppm
Manganese(Mn)	0-5 (ppm)	0.00 ppm
Zinc(Zn)	0-5 (ppm)	0.00 ppm
Ammonia (NH <sub>4</sub> )	0-100 (ppm)	81.29 ppm

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Parameter	Limit Values	Result
Aluminum(Al)	0-5 (ppm)	0.00 ppm
UV Absorbance 280nm	0-0.05	0.02
Magnesium(Mg)	0-5 (ppm)	0.00 ppm
Appearance (S137888)	White powder or crystal powder	white powder or crystal powder
Insoluble matter	pass	Pass
Solubility in 1 M HCl,0.5 M at 20 °C	pass	Pass
λ,0.5 M in 1 M HCl	Pass	Pass

A handwritten signature in black ink that reads "John Su".

John Su  
QA & QC Manager