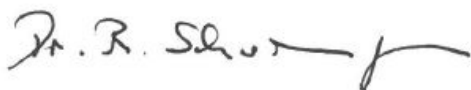


Certificate of Analysis

Product Name: L-CYSTEINE ETHYL ESTER HYDROCHLORIDE
98 %
Product Number: C121908
Batch Number: BCBX0976
Brand: Aldrich
CAS Number: 868-59-7
Formula: $\text{HSCH}_2\text{CH}(\text{NH}_2)\text{COOC}_2\text{H}_5 \cdot \text{HCl}$
Formula Weight: 185.67
Quality Release Date: 08 JUN 2018

| TEST | SPECIFICATION | RESULT |
|--------------------------|----------------------------------------------|-------------------------|
| APPEARANCE (COLOR) | WHITE | WHITE |
| APPEARANCE (FORM) | POWDER, CRYSTALLINE POWDER AND/OR CHUNKS | POWDER |
| PURITY (TLC AREA %) | ≥98 % | 100.0 % |
| ENANTIOMERIC EXCESS | ≥98.5 % (GC) | 99.9 % (GC) |
| SPECIFIC ROTATION (20/D) | -12.5 TO -8.5 DEGREES | -12.4 DEGREES |
| CONCENTRATION | C=1 IN H ₂ O | C=1 IN H ₂ O |
| SOLUBILITY (COLOR) | COLORLESS | COLORLESS |
| SOLUBILITY (TURBIDITY) | CLEAR TO VERY FAINTLY TURBID (< 12.5 NTU) | CLEAR (<3.5 NTU) |
| SOLUBILITY (METHOD) | 5 % IN H ₂ O | 5 % IN H ₂ O |
| CARBON CONTENT | 31.5 - 33.2 | 31.8 % |
| NITROGEN CONTENT | 7.2 - 7.8 | 7.5 % |
| PROTON NMR SPECTRUM | CONFORMS TO STRUCTURE | CONFORMS |



Dr. Reinhold Schwenninger
Quality Assurance
Buchs, Switzerland

Sigma-Aldrich warrants that at the time of the quality release or subsequent retest date this product conformed to the information contained in this publication. The current specification sheet may be available at Sigma-Aldrich.com. For further inquiries, please contact Technical Service. Purchaser must determine the suitability of the product for its particular use. See reverse side of invoice or packing slip for additional terms and conditions of sale.