

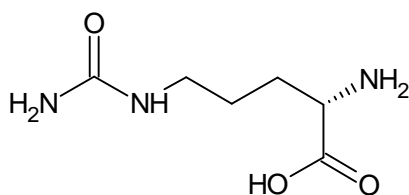


Test Report

Sample name: "Citrulline"
Client: Hansen Sp. z o.o., ul. Zaborowska 8, 05-083 Zaborów, Poland
Purpose of test: Verification of delivered product
Sample description: L-Citrulline
Brand name: Hansen Supplements

Description of substance:

Sample size: 10 g
Property: white powder
Formula: C₆H₁₃N₃O₃
CAS number: 627-77-0
Chemical name: 2-Amino-5-(carbamoylamino)pentanoic acid
Structure:



Batch No.: 010015221009
Date received: 10.02.2023
Test items: Identification of substance, purity, heavy metals
Summary: The sample has been identified and found to be of high quality
Measured purity: **Above 95%** according to ¹H NMR analysis. Appropriate spectra are shown in (Fig. 1 and 2).

Authentication method: Ganadu, M.L., Leoni, V., Crisponi, G. and Nurchi, V., 1991. An investigation on the interaction between Palladium (II) and L-citrulline by ¹H and ¹³C NMR spectroscopy and potentiometry. Polyhedron, 10(3), pp.333-336; https://hmdb.ca/spectra/nmr_one_d/1281; <https://imgen1.guidechem.com/img/tupu/new/1491812155453455.png> and ACDLABS database.



All values are within the relevant standards

Test results:

Purity:

Heavy metals: n.d.

Pb (Lead): n.d.

Hg (Mercury): n.d.

Cd (Cadmium): n.d.

As (Arsen): n.d.

Comments:

n.d. – not detected, below limit of detection on AAS spectr AA240FS + AA240Z + GTA120

Date: 2.05.2023

Tested by: Antoni Szumny

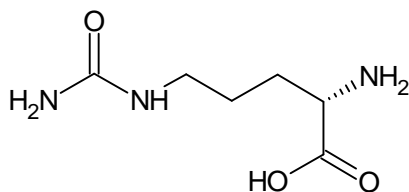


Figure 1. Chemical structure of L-Citrulline



L Citrulline Man_Proton-1-1.jdf
1H
DEUTERIUM OXIDE
0 H's / 13 H's (spectrum / structure)

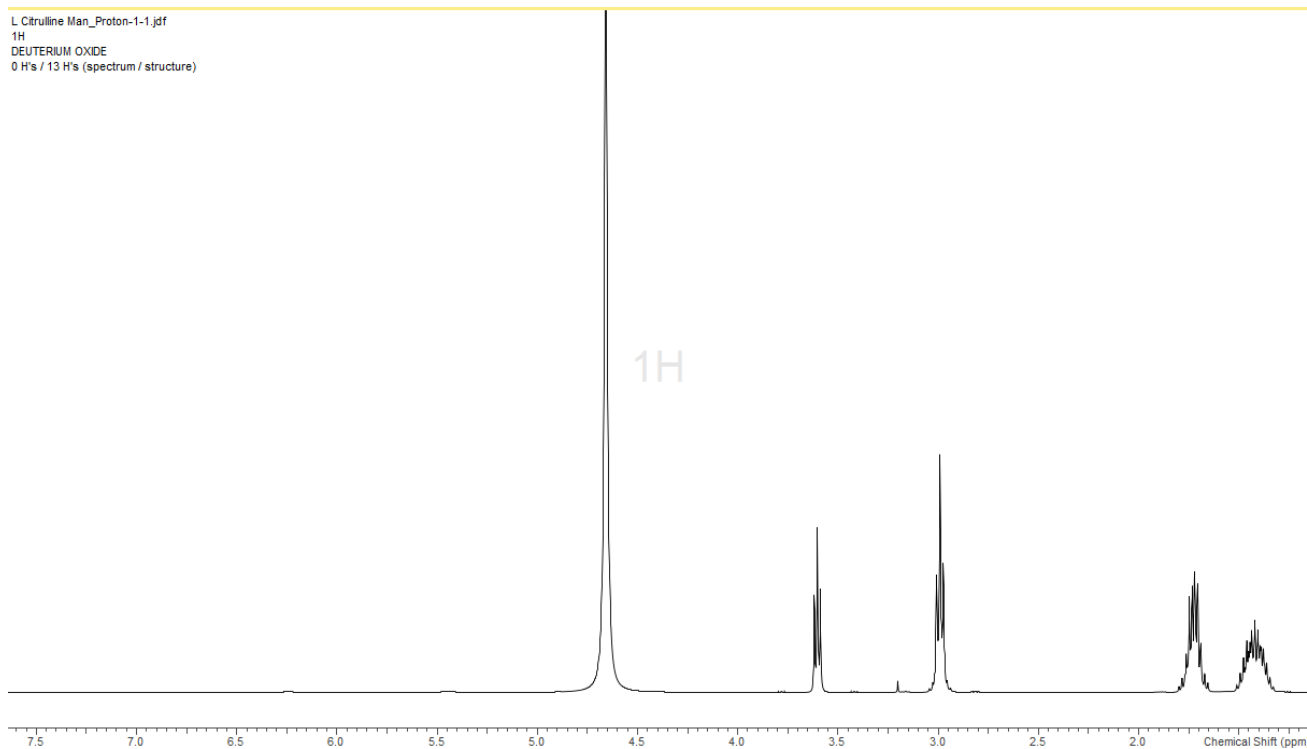


Figure 1. ¹H NMR of L-Citrulline batch No. 010056220506 (In D₂O) full spectrum;

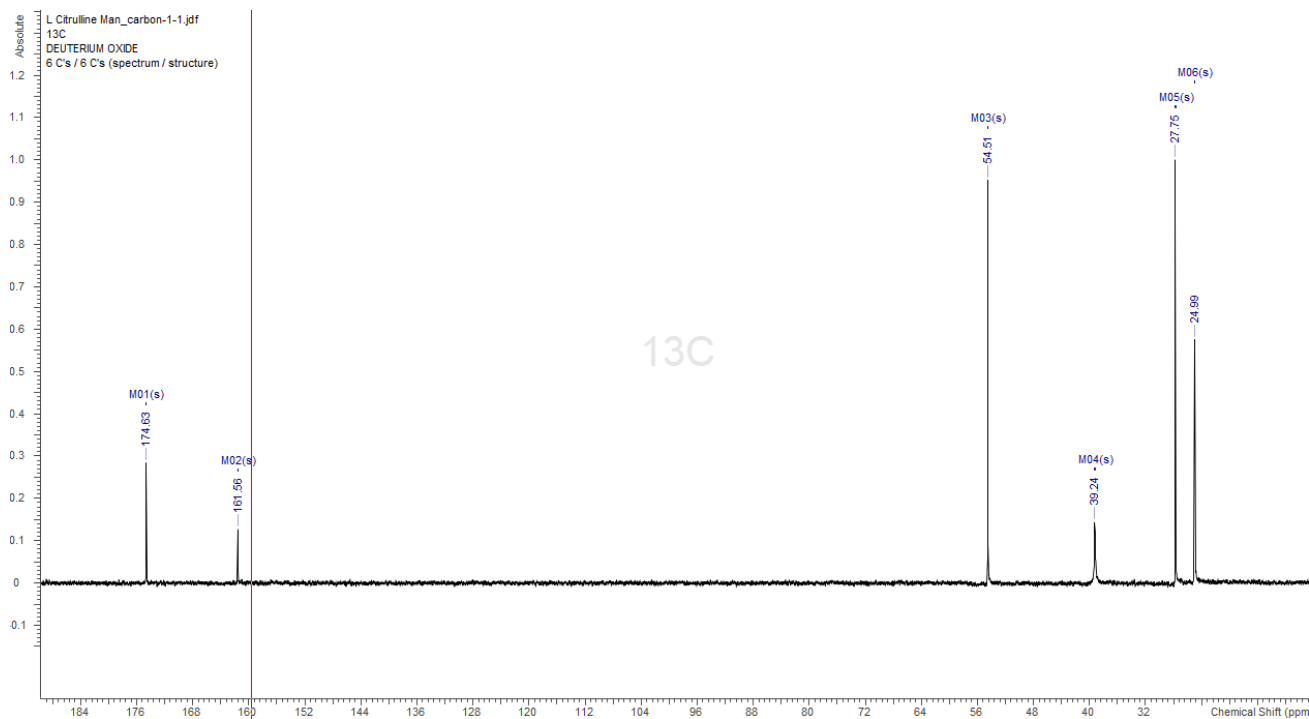


Figure 2 ^{13}C NMR of L-Citrulline, batch No. 010056220506 of (in DMSO) full spectrum;

02.05.2023, Antoni Szumny