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Date: 28.06.21

Cust.No: 96888

## Certificate of analysis

Report-No.: 118275144 - 99 002  
Batch: 19269  
Article: 89581 Betulin  
Manufacturing date: 06/2021  
Expiry date: 06/2026

| Test                                                                                            | Unit | Limit    | Testresult |
|-------------------------------------------------------------------------------------------------|------|----------|------------|
| Appearance, SOP 100005                                                                          |      | powder   | Conform    |
| Color, SOP 100006                                                                               |      | white    | Conform    |
| Solubility, SOP 105001:                                                                         |      |          | Conform    |
| Chloroform                                                                                      |      | soluble  | Conform    |
| Pyridine                                                                                        |      | soluble  | Conform    |
| Identification (UV spectrum from HPLC-DAD analysis) according to specification, SOP 204311      |      | Conform  | Conform    |
| Identification (IR-spectroscopy, Ph.Eur. 10.3, 2.2.24)/USP 43 NF 37 <197>), SOP 206000          |      | Conform  | Conform    |
| Identification (1H-NMR-spectroscopy), (outsourced), SOP 206010                                  |      | Conform  | Conform    |
| Identification (13C-NMR-spectroscopy), (outsourced), SOP 206020                                 |      | Conform  | Conform    |
| Water content, (micro determination, coulometric titration), Ph.Eur. 10.0., 2.5.32, SOP 304291: |      |          |            |
| Mean value                                                                                      | %    |          | 2.1        |
| Betulin, (HPLC), method 1, (% AU), SOP 400771                                                   | %    | >= 95.00 | 98.83      |

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| Test                                                                                                                               | Unit | Limit   | Testresult |
|------------------------------------------------------------------------------------------------------------------------------------|------|---------|------------|
| Peakpurity, (HPLC), SOP 401367                                                                                                     |      | Conform | Conform    |
| Residual solvents, (headspace-GC), SOP 805765:                                                                                     |      |         |            |
| Residual solvents                                                                                                                  | %    |         | 0.11       |
| Inorganic impurities, (ICP-MS), for reference substances, SOP 811701:                                                              |      |         |            |
| Sodium                                                                                                                             | %    |         | < 0.1      |
| Potassium                                                                                                                          | %    |         | < 0.1      |
| Magnesium                                                                                                                          | %    |         | < 0.1      |
| Calcium                                                                                                                            | %    |         | < 0.1      |
| Aluminium                                                                                                                          | %    |         | < 0.1      |
| Phosphorus                                                                                                                         | %    |         | < 0.1      |
| Sulfur                                                                                                                             | %    |         | < 1.0      |
| Content, SOP 890000, calculated in (%):<br>(100 - water - residual solvents - inorganic impurities) x chromatographic purity / 100 | %    |         | 97         |

This PhytoLab phyproof® reference standard is by definition a primary reference standard and does not need to be qualified against any other reference standard. The identity of the reference standard has been substantiated by at least two independent analytical methods such as IR, NMR, UV or MS analysis. A mass balance approach, which takes chromatographic purity into account, as well as the contents of water, residual solvents, inorganic impurities, and the counter ion (if the reference standard is present as a salt) is applied in the calculation of the absolute purity as given in this COA (see description of SOP 8900XX).

The absolute purity value (and not just the chromatographic purity result obtained by means of HPLC or GC) must be used in all quantitative calculations as the chromatographic techniques do not yet account for water, residual solvents and inorganic impurities.

### Further information:

**Shelf life/stability:** PhytoLab certifies that this reference standard will fulfill the specifications outlined in this COA until the expiry date, as long as the reference substance is stored in the original unopened vial within the recommended temperature range. PhytoLab is no longer able to guarantee the stability of the reference standard once the vial has been opened.

**Long-term storage and handling:** the reference standard should be stored in the original unopened vial, protected against light and humidity in an airtight container, within the temperature range given on the label and accompanying data sheet. If stored below room temperature, the vial should be warmed up to room temperature in a desiccator before it is opened in order to avoid condensation of humidity. The user assumes responsibility for deciding how previously opened reference standard vials should be used and the user must ensure that the contents of opened vials are still suitable for their intended use.

**Exact weight:** the exact weight of each vial is given on the label of the inner vial to two decimal places. This information may be used to produce stock solutions of a known concentration without having to weigh in the reference substance again. If used for this purpose, the content of the vial must be quantitatively transferred to a volumetric flask and filled up to the required level. Please note that PhytoLab is unable to guarantee the stability of the reference standard in solution.

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|------|------|-------|------------|

Intended use: this reference standard is solely intended for laboratory analytical purposes, research & development, and scientific teaching and training purposes. It may not be used for any other purpose and particularly not for use in, or the production of, food, animal feed, human or veterinary drugs, cosmetics, medicinal products or diagnostic agents, including in-vitro diagnostic agents. PhytoLab is unable to guarantee the suitability of this reference standard for any particular application other than its qualitative and quantitative use in chromatography and identification testing.

Further information about this reference standard can be found on the accompanying data sheet or in our webshop. Spectral and chromatographic data, and a description of the applied chromatographic method, are provided in the attachments to this COA. A detailed explanation of all data given on the COA can be found in the guide that is available from the download area in our webshop, where you can also download all of the safety data sheets.

Vestenbergsreuth, 28.06.21

Dr. Tina Zöllner  
Manager Reference Substances

This is a computer print and valid without signature. A signed certificate of analysis can be taken on request.