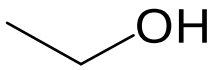
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# CERTIFICATE OF ANALYSIS

## Certified Reference Material

| | |
|---|---|
| Product Name: | **Ethanol 400 mg/dL Standard** |
| Product Description: | Ethanol 400 mg/dL Standard (10 x 1mL) |
| Part number: | **5190-9763** |
| Lot Number: | 46036J |
| CAS Number: | 64-17-5 |
| Molecular Formula: | $C_2H_6O$ |
| Molecular Weight: | 46.07 |
| Solvent: | Water |
| Volume per Ampoule: | Not less than 1 ml [1] |
| Long-term Storage: | 2 to 8 °C, dark |
| Expiry Date: | 31 March 2024 |
| Intended Use: | For forensic use. The primary aim of this material is for identification, calibration and quantification. |




| Component | Concentration ("as is") | Uncertainty |
|---|---|---|
| see product name | 400.00 mg/100 ml [2] | U = 1.76 mg/100 ml [3] |

Uncertainty of the concentration is expressed as an expanded uncertainty in accordance with ISO 17025 and 17034 at the about 95 % level of confidence using a coverage factor of k = 2 and has been calculated by statistical analysis of our production system and incorporates uncertainty of the purity, material density and balance and weighing technique.

Concentration based on material weighings and material purity factor (assay of the neat material).

The solution's concentration and homogeneity are verified by independent method.

The manufacturer certifies that this standard meets the specification stated in this certificate and warrants this product to meet the stated acceptance criteria through the retest date when stored unopened as recommended. Product should be used shortly after opening to avoid concentration changes due to evaporation. Warranty does not apply to ampoules stored after opening.

**Signed:**

Dr. Sabine Schröder
Unit for Reference Materials

[1] Ampoules are overfilled to ensure a minimum 1 ml volume fill. We advise laboratories to use measured volumes of this standard solution before diluting to the desired concentration.

[2] The value is based on the results of analytical techniques, which calibration and verification was carried out with standards traceable to SI-units. The value is expressed on an "as is" basis.
The concentration with its uncertainty is valid in the range between 19 °C and 25 °C.
The identity is verified by data from international scientific literature.
Gravimetrically prepared using qualified balances calibrated annually by accredited calibration service. Calibration verification performed daily prior to use utilizing weights traceable to SI via other mass standards.

[3] The uncertainty "U" is the expanded uncertainty estimated in accordance with the Guide to the Expression of Uncertainty in Measurement (GUM). It is corresponding to a level of confidence of about 95 %. Standard uncertainties are indicated with "u".



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| **Verification of Concentration and Homogeneity** | | | | |
|---|---|---|---|---|
| Lot Number | Verified Concentration (mg/100 ml)<br>*Result* | *Acceptance Criteria* | % RSD – Homogeneity<br>*Result* | *Acceptance Criteria* |
| 46036J | 398.91 | ± 3 % | 1.71 | ≤ 3 % |
| **Results compared to NIST and ERM** | | | | |
| Standard | Verified Concentration (mg/100 ml)<br>*Result* | *Acceptance Criteria* | % RSD – Homogeneity<br>*Result* | *Acceptance Criteria* |
| NIST Lot SRM 2900 (95.6 % (mass fraction)) | 394.69 | ± 3 % | 1.15 | ≤ 3 % |
| ERM Lot ERM-AC403d (200 mg/100ml) | 403.13 | ± 3 % | 1.62 | ≤ 3 % |
| Concentration verified by GC/MS2 | | | | |

| **Solution Standard Assay Parameters** | | | | **External Calibration (100 % amount)** | |
|---|---|---|---|---|---|
| Analysis Method | GC/MS2 | | | | |
| Column: | DB-624, 60 m x 0.53 mm x 3 µm | | | Number of Measurements: | 6 |
| Injector: | 180 °C | | | | |
| Flow: | 0.8 ml/min | | | | |
| Oven Program: | Rate | °C | Time | | |
| | | 35 | 4 min | | |
| | 12 °C/min | 220 | 0 min (run time 19.43 min) | | |
| Detector: | EI, 70eV, ion source temperature: 220 °C | | | | |

| **Neat Material Data** | | |
|---|---|---|
| Product Name: | Ethanol | |
| CAS Number: | 64-17-5 | |
| Molecular Formula: | $C_2H_6O$ | |
| Molecular Weight: | 46.07 | |
| Compound Lot: | 26530 | |
| **Test** | **Method** | **Result** |
| $^1$H-NMR Spectrum* | SOP 06-053 | conform / complies to structure |
| **Assay by quantitative NMR ("as is")*** | **Quant. NMR** | **100.01 %** |
| The expanded uncertainty according to the assay is U = 0.44 % (about 95 % level of confidence using a coverage factor of k = 2). | | |

*: Validated method performed by ISO/IEC 17025 accredited testing lab

The assay of the neat material is verified by titration.



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**Hazard Information:** Refer to the Material Safety Data Sheet (MSDS), which can be obtained at www.agilent.com/chem/msds.

**Homogeneity:** This solution was determined to be homogeneous by procedures consistent with the requirements of ISO 17034 and ISO Guide 35. Replicate samples of the finished solution were analyzed to confirm its homogeneity, in accordance with QSP 6-13 Assessment of Homogeneity and Stability. To ensure homogeneity, users should not take a smaller sub-sample than specified in the Instructions for Use, as doing so will invalidate the certified values and uncertainties.

**Further Information:** Please contact Agilent Technologies for further information about this CRM.

**Quality Certifications:** This CRM was prepared under a quality management system that is:

- Registered to ISO 9001 – Quality Management Systems – Requirements (DQS 10224-QM08)
- Accredited to ISO 17034 – General Requirements for the Competence of Reference Material Producers (DAkkS D-RM-14176-01-00)
    - ISO 17034 references additional requirements specified in ISO Guide 31 and ISO Guide 35.
- Accredited to ISO/IEC 17025 – General Requirements for the Competence of Testing and Calibration Laboratories (DAkkS D-PL-14176-01-00)



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