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Ref. No.: CML-HRM-1010A/09
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Certificate of Analysis

CERTIFIED REFERENCE MATERIAL
HRM-1010A

Saccharin

Batch Number
STY-0050-001

Description
A unit of the certified reference material (CRM) consists of 250 mg of saccharin in a screw-capped amber glass vial. The mass balance approach was adopted to determine the mass fractions (mg/g) of four classes of impurities, namely: structurally-related organic compounds, volatile organic compounds, total non-volatiles and water content, present in the CRM. The mass fraction value of saccharin was then obtained by subtracting the mass fraction values of the impurities from 1,000.

The reference material was produced with reference to the requirements set out in ISO/IEC 17025: 2017 [1], ISO Guide 17034:2016 [2] and ISO Guide 35:2017 [3].

Certified Mass Fraction Value
A certified value is a value for which a laboratory has the highest confidence in its accuracy. The certified mass fraction value given below is based on the results obtained by the mass balance approach:

Certified Mass Fraction Value: 997.4 ± 3.3 mg/g

The final result is expressed as the certified value ± the expanded uncertainty.

The uncertainty listed with the certified value is an expanded uncertainty about the mean, with coverage factor 2 (approximately 95 % confidence). It was evaluated by combining uncertainties in the measurement of mass fractions of the four classes of impurities and the homogeneity and stability of the CRM, in accordance with ISO/IEC Guide 98-3:2008 [4].

Homogeneity
Homogeneity testing on saccharin and structurally-related organic compounds was performed on two sub-samples taken from eight vials using HPLC-DAD. The sample size taken for homogeneity testing was approximately 10 mg to produce a solution with saccharin concentration of about 2 mg/g. No significant differences in the between and within-bottle variances were found using one-way ANOVA at 95 % confidence level [3]. Thus, the material was regarded to be sufficiently homogeneous.

Stability

The short-term stability of saccharin and structurally-related organic compounds was studied. The material was stored at 50 °C (maximum allowable transportation temperature) for up to 14 days. The results showed that saccharin was stable over the study period.

The long-term stability of saccharin and structurally-related organic compounds at room temperature (18 °C to 25 °C) was evaluated on three occasions over a period of up to 3 months after preparation. The results showed that saccharin was stable over the study period.

Validity of Certified Mass Fraction Value

The certified mass fraction value is valid within the specified measurement uncertainty until **2 Feb 2027**, provided that the reference material is subjected to the same handling and storage conditions as stated below.

The CRM will be continuously monitored during the validity period to determine if any substantive change to the certified value has occurred. If necessary, its user will be advised or an updated COA may be issued when the property value of the CRM is found to have changed.

Analytical Methods

The sample was analysed by

(i) high performance liquid chromatography with diode array detection (HPLC-DAD) to determine the structurally-related organic compounds;
(ii) thermogravimetric analyser (TGA) and headspace gas chromatography (GC-MS) to determine the total volatile organic compounds;
(iii) TGA to determine the total non-volatiles; and
(iv) Karl Fisher coulometer to determine the water content.

The Table below summarises the results used for the determination of the certified mass fraction value:

Component(s)	Technique	Mass Fraction (mg/g)	Standard Uncertainty (mg/g)
Structurally-related organic compounds	HPLC-DAD	2.19	0.43
Total volatile organic compounds	TGA	< 2.3 (LOD*)	0.66
Total non-volatiles	TGA	< 5 (LOD*)	1.44
Water	Karl Fisher coulometry[1]	0.403	0.052

*LOD: limit of detection
[1] Validated with water saturated 1-octanol (SRM 2890) from NIST, USA.

Metrological Traceability

The certified mass fraction value is traceable to the International System of Unit (SI) through the mass balance method by the Health Sciences Authority (HSA).

Intended Use

The CRM is intended for use as a calibrant or quality control (QC).

Instructions for Use

After use, the bottle must be tightly re-capped and protected from moisture and light. The minimum sample size for each use should be 10 mg.

Storage

The CRM should be properly sealed and stored at room temperature (18 °C to 25 °C) in a dry and cool area in its original bottle when not in use. Protect the material from moisture and light.

Safety Precautions for Users

Treat the material as hazardous substance. Use appropriate work practices when handling to avoid skin or eye contact, ingestion or inhalation of dust.

Further Information

Please direct all enquiries regarding this reference material to the contact above.

References

[1] ISO/IEC 17025:2017 General requirements for the competence of testing and calibration laboratories.
[2] ISO 17034:2016 General requirements for the competence of reference material producers.
[3] ISO Guide 35:2017 Reference materials – General and statistical principles for certification.
[4] ISO/IEC Guide 98-3:2008 Uncertainty of measurement – Part 3: Guide to the expression of uncertainty in measurement (GUM:1995).

Certificate Revision Records

Certificate of Analysis CML-HRM-1010A/02 replaces Certificate CML-HRM-1010A/01 issued on 2 Feb 2015.

Certificate of Analysis CML-HRM-1010A/03 replaces Certificate CML-HRM-1010A/02 issued on 28 Jan 2016.

Certificate of Analysis CML-HRM-1010A/04 replaces Certificate CML-HRM-1010A/03 issued on 26 Jan 2017.

Certificate of Analysis CML-HRM-1010A/05 replaces Certificate CML-HRM-1010A/04 issued on 25 Jan 2018.

Certificate of Analysis CML-HRM-1010A/06 replaces Certificate CML-HRM-1010A/05 issued on 17 Jan 2019.

Certificate of Analysis CML-HRM-1010A/07 replaces Certificate CML-HRM-1010A/06 issued on 19 Dec 2019.

Certificate of Analysis CML-HRM-1010A/08 replaces Certificate CML-HRM-1010A/07 issued on 11 Jan 2021.

Certificate of Analysis CML-HRM-1010A/09 replaces Certificate CML-HRM-1010A/08 issued on 25 Aug 2021.

Note

HSA does not assume any liability with respect to any loss caused by improper use and/or storage of the CRM by the customer.

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