National Research Council Canada | Conseil national de recherches Canada

Certificate of Analysis

Certified Reference Material

CGUM-1

Soft Chew Edible Certified Reference Material for Cannabinoids

CGUM-1 is a certified reference material (CRM) consisting of gelatin-based edible soft chews that have been infused with cannabinoids extracted from cannabis. This CRM is designed for use in method development, validation, and quality control for the analysis of cannabinoid-infused edible soft chew products or related matrices. Each unit of CGUM-1 contains four soft chew edibles. Certified values for the mass fraction of cannabinoids in CGUM-1 have been established, as listed in Table 1.

Table 1: Certified values and expanded uncertainties (*k* = 2) for CGUM-1

Compound	Symbol	Mass fraction mg/g
Δ^9-tetrahydrocannabinol (a,b)	Δ^9-THC	0.552 ± 0.074
cannabidiol (a,b)	CBD	0.570 ± 0.020
cannabinol (a,b)	CBN	0.605 ± 0.035
cannabigerol (a,b)	CBG	0.0173 ± 0.0020
cannabivarin (a,b)	CBV	0.00264 ± 0.00033
cannabichromene (a,b)	CBC	0.00684 ± 0.00048
tetrahydrocannabivarin (a,b)	THCV	0.00332 ± 0.00027
cannabidivarin (a)	CBDV	0.00290 ± 0.00016
Δ^8-tetrahydrocannabinol (a,b)	Δ^8-THC	0.00512 ± 0.00026

Refer to the sections below for additional explanations

Period of validity: until May 2030
Storage conditions: –20 °C or below

DOI: 10.4224/crm.2026.cgum-1

Intended use

This certified reference material is primarily intended for use in method development, validation, and quality control for the analysis of Δ^9-THC, CBD, CBN, CBG, CBV, CBC, THCV, CBDV, and Δ^8-THC in cannabinoid-infused edible soft chew products or similar matrices.

Preparation of material

Several candidate soft chew edible materials were purchased from Health Canada-licensed producers through the Ontario Cannabis Store and were evaluated for cannabinoid profile and homogeneity. Based on its balanced cannabinoid profile and high degree of between- and within-package homogeneity, a bulk quantity of one product from a single lot was acquired to produce CGUM-1. The soft chews were combined and tumbled at the National Research Council of Canada (NRC) to remove external sugar granules. Four soft chews were packaged in resealable plastic bags and placed inside resealable translucent metallic bags with a desiccant pack.

Characterization of material

The explanatory list of letters next to each compound (Table 1) refers to the instrumental method used for measurements:

a) Liquid chromatography – tandem mass spectrometry (LC−MS/MS)

b) Liquid chromatography – ultraviolet spectrophotometry (LC−UV)

Metrological traceability

Results for Δ^9-THC, CBD, and CBG presented in this certificate are traceable to the International System of Units (SI) through gravimetrically prepared standards of NRC CRMs THCN-1 (Δ^9-THC), CDBN-1 (CBD), and CBGN-1 (CBG). For all other cannabinoids, certified reference materials were purchased from Cerilliant Corporation (Round Rock, Texas, USA).

Homogeneity

The material was tested for homogeneity at the NRC using LC−MS/MS. Results from 500 mg subsamples of a single soft chew from randomly selected units were evaluated using a Bayesian analysis of variance (BANOVA) [1] to estimate both within-unit and between-unit heterogeneity components. These uncertainties were combined to assign an associated uncertainty component.

Stability

The effects of freeze-thaw (F/T) cycles, stability during transport, and long-term stability of the cannabinoids in CGUM-1 were assessed at the NRC using LC−MS/MS [2]. Freeze-thaw stability was assessed over twenty F/T cycles from –80 °C to +20 °C. The results were evaluated as a function of the number of F/T cycles using ordinary least squares fitting and indicated no significant instability trend for all cannabinoids. Therefore, the uncertainty due to F/T stability was considered negligible and set to zero.

Transportation and long-term stability were carried out using an isochronous approach. Packages were stored at temperatures ranging from –20 to +40 °C for up to six months and compared to reference samples stored at –80 °C. Degradation of each cannabinoid was modelled using a pseudo first-order reaction and Arrhenius equation for rate-constant dependence on temperature, using Bayesian model fitting [2]. The uncertainty components due to transportation and long-term stability were determined at +20 °C over 4 weeks and at –20 °C over 5 years, respectively. The transportation stability uncertainty represents a conservative estimate to include possible shipping delays. These uncertainties were combined to assign an uncertainty related to stability.

Uncertainty

The expanded uncertainty (U) for all values is equal to $U = ku_c$, where u_c is the combined standard uncertainty calculated according to the Joint Committee for Guides in Metrology (JCGM) [3] and k is the coverage factor. A coverage factor of $k = 2$ was applied which corresponds to a level of confidence of approximately 95 %.

All reasonable sources of uncertainty related to the certified values in Table 1 were considered. Included in the combined uncertainty estimate are uncertainties in the batch characterization, uncertainties related to possible within-unit and between-unit variation, uncertainties related to stability, and uncertainties related to the different methods.

Storage

The material shall be stored at –20 °C or below.

Instructions for handling and use

Prior to opening, each package should be allowed to warm to room temperature. A single soft chew can be used for analysis or it can be cut into small pieces for analysis as long as a minimum sample mass of 500 mg is used (approximately 1/7 the mass of one soft chew). After use, both packages should be tightly sealed with the desiccant pack and immediately returned to the freezer. Repeated sampling is permitted, although care must be taken not to introduce contamination.

Health and safety information

Only qualified personnel should handle the material and appropriate disposal methods should be used. A Safety Data Sheet (SDS) is available at doi.org/10.4224/crm.2026.cgum-1. For laboratory use only; not for human consumption, therapeutic, drug, household, or any other uses.

Period of validity

The certified values are valid until May 2030, provided the storage and instructions for handling and use specified in this certificate are followed.

Quality Management System

The NRC is Canada's national metrology institute (NMI) and is a signatory of the International Committee for Weights and Measures Mutual Recognition Arrangement (CIPM MRA). The CIPM MRA was developed in a response to a growing need for an open, transparent, and comprehensive scheme to give users reliable quantitative information on the comparability of national metrology services and to provide the technical basis for wider agreements negotiated for international trade, commerce, and regulatory affairs. Our Quality Management System for measurement services and certified reference materials conforms to the requirements of ISO/IEC 17025 and ISO 17034.

Description of terms

Certified values are those for which the NRC has the highest confidence and that all known and suspected sources of bias have been considered by the NRC and are reflected in the stated expanded uncertainties.

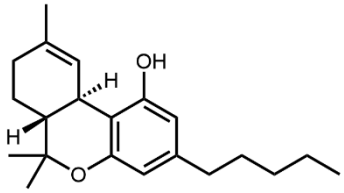
Supplemental information

Bibliographic information and any additional technical supplemental information is available at doi.org/10.4224/crm.2026.cgum-1.

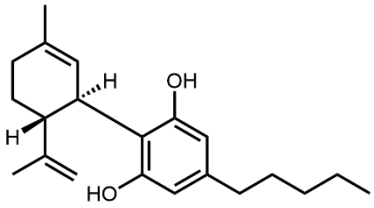
References

1. van der Veen AMH. Bayesian analysis of homogeneity studies in the production of reference materials. Accred Qual Assur. 2017; 22 (6): 307-319. http://doi.org/10.1007/s00769-017-1292-6
2. Meija J, McRae G, Miles CO, Melanson JE. Thermal stability of cannabinoids in dried cannabis: a kinetic study. Anal Bioanal Chem. 2022; 414: 377-384. https://doi.org/10.1007/s00216-020-03098-2
3. JCGM 100:2008. Evaluation of measurement data – Guide to the expression of uncertainty in measurement. Joint Committee for Guides in Metrology (JCGM); 2008. https://doi.org/10.59161/JCGM100-2008E

Appendix



Δ^9-tetrahydrocannabinol (Δ^9-THC)
CAS registry number: 1972-08-3
InChI Key: CYQFCXCEBYINGO-IAGOWNOFSA-N
Molecular formula: $C_{21}H_{30}O_2$
Molar mass: 314.46 g/mol



cannabidiol (CBD)
CAS registry number: 13956-29-1
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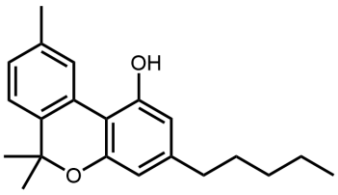
Molecular formula: $C_{21}H_{30}O_2$
Molar mass: 314.46 g/mol



cannabinol (CBN)
CAS registry number: 521-35-7
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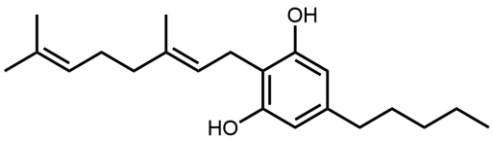
Molar mass: 310.43 g/mol



cannabigerol (CBG)
CAS registry number: 25654-31-3
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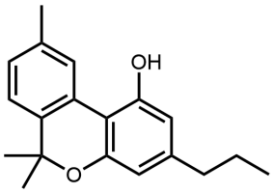
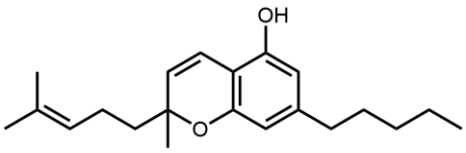
Molecular formula: $C_{21}H_{32}O_2$
Molar mass: 316.48 g/mol



cannabivarin (CBV)
CAS registry number: 33745-21-0
InChI Key: SVTKBAIRFMXQQF-UHFFFAOYSA-N
Molecular formula: $C_{19}H_{22}O_2$
Molar mass: 282.38 g/mol



cannabichromene (CBC)
CAS registry number: 20675-51-8
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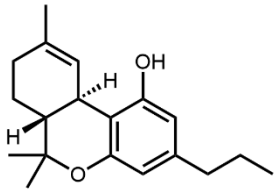
Molecular formula: $C_{21}H_{30}O_2$
Molar mass: 314.46 g/mol



tetrahydrocannabivarin (THCV)
CAS registry number: 31262-37-0
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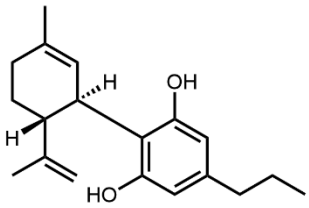
Molecular formula: $C_{19}H_{26}O_2$
Molar mass: 286.41 g/mol



cannabidivarin (CBDV)
CAS registry number: 24274-48-4
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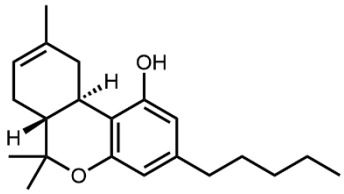
Molar mass: 286.41 g/mol



Δ^8-tetrahydrocannabinol (Δ^8-THC)
CAS registry number: 5957-75-5
InChI Key: HCAWPGARWVBULJ-UHFFFAOYSA-N
Molecular formula: $C_{21}H_{30}O_2$
Molar mass: 314.46 g/mol

Authorship

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Acknowledgements

The following staff members at the NRC contributed to the production and certification of CGUM-1: Juris Meija, Douglas MacKenzie, Bradley Stocks, Adilah Bahadoor, and Marie-Pier Thibeault.

Date of issue: April 2026

Document version: 20260401

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This certificate is only valid if the corresponding material was obtained directly from the NRC or an authorized reseller. Users should ensure that the certificate they have is current. For updates, please refer to doi.org/10.4224/crm.2026.cgum-1.

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