TÜBİTAK
ULUSAL METROLOJİ ENSTİTÜSÜ

TÜBİTAK UME

Certificate of the Reference Material

Name of the Material : Borax Pentahydrate

Material Code : UME CRM 1208

Issue Date : 28.06.2021

Revision Date : 27.03.2025 (Revision history can be found on the last page)

Validity Period of the Certificate : 12 months from the sales date

Certified Values :

Parameter	Mass Fraction [4]	Uncertainty [4,5]	Unit
B [1]	15.14	0.58	g/100 g
Na [2]	16.23	0.93	g/100 g
Fe [1]	106.7	6.5	mg/kg
Si [2]	29.7	2.5	mg/kg
Cl^- [3]	180	11	mg/kg
SO_4^{2-} [3]	100	12	mg/kg

[1] The certified value is obtained by using ICP-OES and ID-ICP-MS methods.

[2] The certified value is obtained by using ICP-OES and ICP-MS methods.

[3] The certified value is obtained by using IC method. Methods for the determinations of total sulphur by ICP-MS and ICP-OES for SO_4^{2-}, and of total chlorine by ICP-OES for Cl^-were used as supporting methods.

[4] The certified values and the uncertainties are traceable to the International System of Units (SI).

[5] The expanded uncertainty of the certified value includes characterization, homogeneity, stability components and is stated as the standard uncertainty of measurement multiplied by the coverage factor k = 2, which for a normal distribution corresponds to a coverage probability of approximately 95 %. The standard uncertainty of measurement has been determined in accordance with GUM “Guide to the Expression of Uncertainty in Measurement”.

Sales Date

Assoc. Prof. Mustafa ÇETİNTAŞ
Acting Director

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Informative Values

Parameter	Mass Fraction [1]	Uncertainty [1,2]	Unit
B_2O_3	48.8	1.9	g/100 g
Na_2O	21.9	1.3	g/100 g

[1] Calculated using the values in the atomic weight table published by IUPAC, assuming that the total amounts of B and Na certified are all in the form of B_2O_3 and Na_2O, respectively.

[2] The uncertainty value includes the certified uncertainty and the uncertainty components of the atomic masses, and is the result of multiplying the calculated standard measurement uncertainty by the coverage factor k = 2, which provides a confidence level of approximately 95 % for the normal distribution.

Description

The material is approximately 135 g borax pentahydrate which is filled into the amber glass bottle after mixing the borax pentahydrate which was previously spiked with Fe and Cl^-, dried and milled with unspiked borax pentahydrate followed by milling, sieving and homogenization. The detailed information about the preparation of the material can be found in the certification report.

Intended Use

This material is intended to be used in the validation of analytical methods for the determination of B, Na, Fe, Si, Cl^- and SO_4^{2-} in borax pentahydrate and for quality control of activities in this field.

Instructions for Use

Before opening and taking a sample, the bottle should be shaken slowly and rotated in three dimension by applying small impacts to eliminate possible clumping and re-homogenize the content.

Minimum sample intake is 1 g. This material can be safely dispatched under conditions where the temperature does not exceed 45 °C for up to two weeks. The material was neither subjected to any drying process before the measurements nor was a dry mass correction applied during the certification studies and certified as it is. All the sample preparation stages during certification studies were carried out under controlled laboratory conditions at (45 ± 15) %rh relative humidity and (23 ± 5) °C temperature. Under these conditions, no significant change in moisture content of the material to affect the certified values was detected. When using the material, all precautions should be taken to prevent the material from being exposed to contamination and change in moisture content of the material.

Storage Conditions

The material should be stored at (18 ± 4) °C in dark environment.

TÜBİTAK UME cannot be held responsible for changes that might happen to the material at customer's premises due to noncompliance with the instructions for use, and the storage conditions given.

Safety Information

The usual laboratory safety measures apply.

It is strongly recommended that the material must be handled and disposed according to the safety guidelines where applicable. Please refer to the Safety Data Sheet (SDS) before any use of the material.

Participants

Information about the laboratory participated in the characterization study are given in the following table.

Laboratory	Address
TÜBİTAK UME	TÜBİTAK Gebze Yerleşkesi, Barış Mahallesi, Dr. Zeki Acar Caddesi No.1, 41470 Gebze - Kocaeli / Türkiye

Methods and/or Techniques Used for the Determination of the Certified Values

Information about the techniques used in the characterisation study are given in the following table.

Method/Technique	Parameter
Isotope Dilution Inductively Coupled Plasma Mass Spectrometry (ID-ICP-MS)	B, Fe
Inductively Coupled Plasma Mass Spectrometry (ICP-MS)	Na, Si
Inductively Coupled Plasma Optical Emission Spectrometry (ICP-OES)	B, Fe, Si
Ion Chromatography (IC)	Cl^-, SO_4^{2-}

Revision History

Date	Remarks
28.06.2021	First issue.
27.03.2025	Certificate is revised according to the updated template for certificates. Uncertainty value for chloride is revised.