

Certificate

Microanalytical Reference Material

RVMT-BM-1

BlackMass Powder

Certified Values

Element	Mass Fraction [g/100g]	Exp. Uncertainty [g/100g]	n Data sets
Li	4.05	0.15	20
Ni	28.76	0.46	22
Mn	1.87	0.04	23
Co	4.05	0.12	20
Al	0.276	0.08	12
C	39.76	0.78	8
Fe	0.0114	0.0045	15
O	19.58	0.80	4
S	0.022	0.004	5
Zr	0.158	0.016	6

Informative Values

Element	Mass Fraction [g/100g]	Exp. Uncertainty [g/100g]
Cu	0.078	0.025
F	0.345	0.027
P	0.033	0.006
Si	0.020	n.d.
	[mg/kg]	[mg/kg]
Ca	27	4
Cr	14	5
Mg	12.4	0.6
Na	597	25

The certified and informative values represent the unweighted means of accepted data sets. An acceptable data set consists of three single results from three separate sampling and analysis steps. Each set, in this case, was obtained by a different laboratory, different dissolution method and/or a different analytical technique.

The expanded uncertainty corresponds to a level of confidence of approximately 95 % as defined in the Guide to the expression of uncertainty in measurement^[1]. Informative values did not meet one or more of the criteria required for certification, such as sufficiently low uncertainty, demonstrated homogeneity, or a sufficient number of accepted data sets (< 4).

Glass bottle and pressed pellet serial numbers: {SERIENNUMMER}

Date of dispatch: {LIEFERDATUM}

This certificate was approved by myStandards GmbH, Kiel, 19.08.2026

Signed:



Simon Nordstad
CEO & Founder
Method Development & Production



Christina Wittke
CEO & Founder
Management & Marketing

Intended Use

This certified reference material (CRM) is designed for use by laboratories undertaking the determination of major and trace element mass fractions in lithium-nickel-manganese-cobalt oxide (NMC) BlackMass and equivalent matrices. It is suitable for calibration and as a secondary reference material for the assessment of a measurement procedure and quality control. Note that the material may only be used for a single purpose in the same measurement process. For example, it must not be used for calibration and method validation at the same time.

Description of the CRM

This CRM is a BlackMass powder from battery production scrap, i.e., it contains fluorine in an amount to be expected of pure cathode material (< 0.5 g/100g). The material is supplied in amber glass bottles containing approximately 50 g.

Handling advice and Storage information

The material should be stored in a dry, dark and clean environment around room temperature. Transport does not require any special conditions.

Before sampling, manual homogenisation by turning the sample clockwise and counterclockwise at a 45° angle is recommended. Additional drying at 105 °C can be undertaken if moisture uptake is suspected.

Period of Validity

Provided the storage and handling conditions are met, no chemical alteration is known to exist, and the assigned values will remain stable. Therefore, the product information and assigned values for this CRM are valid for one year, pending stability monitoring, from the date of dispatch. This validity may be extended as

further evidence of stability becomes available. The manufacturer will inform the customer if any alterations occur.

Safety instructions

BlackMass powders can cause harm if ingested, inhaled or in contact with skin or eyes. In its pressed form, however, it does not exhibit any dusting. Appropriate personal protective equipment (PPE) is recommended.

Minimal sample size

The minimum sample size should be 100 mg. This is the same amount that was used during homogeneity testing.

Metrological Traceability

This CRM has been produced in accordance with the recommendations specified in ISO 17034^[2] and ISO 33405^[3]. The certified values are metrologically traceable to SI units through calibrations based on pure metals, stoichiometric compounds, or traceable commercial solutions.

Further Information

A detailed certification report describing the characterization, homogeneity assessment, stability evaluation and assignment of the certified and informative values is available on the myStandards website product page.

List of participating laboratories in alphabetical order

Alfred H. Knight Group (The John Knight Laboratory, UK)
Alfred H. Knight Group (North America Ltd., USA)
Alfred H. Knight (Jinling Co., Ltd., China)
Aurubis AG Hamburg
BASF Battery Materials and Recycling Schwarzheide GmbH
Bruker AXS Advanced X-ray Solutions SE
CHEMAD GmbH
ChemiLytics GmbH & Co. KG
Dorfner Anzaplan GmbH
Eurofins Umwelt Ost GmbH
Fluxana GmbH & Co. KG
Fraunhofer ISC
LECO EATC GmbH
MEET at the University of Münster
PowerCo SE
SGS Chemie-, Industrie- und Spezialanalytik GmbH
SGS Institut Fresenius GmbH
SPECTRO Analytical Instruments GmbH
Thermo Fisher Scientific (Bremen) GmbH
Umicore AG & Co. KG

Document History

Version	Date	Changes applied
1.0	16.06.2026	First publication of preliminary values
1.1	19.08.2026	Publication of final values

References

[1] ISO/IEC Guide 98-3:2008, *Uncertainty of measurement - Part 3: Guide to the expression of uncertainty in measurement (GUM:1995)*

[2] EN ISO 17034:2016 (D/E), *General requirements for the competence of reference material producers*

[3] ISO 33405:2024.05 (D/E), *Reference materials – Approaches for characterization and assessment of homogeneity and stability.*

Legal notice

Our general terms and conditions of sale and delivery apply. The valid version of our general terms and conditions (as of 01.09.2019) - can be found on our website: <https://www.my-standards.com/terms-and-conditions/>. They are also available on request.