myStandards GmbH
Schauenburger Straße 116
24118 Kiel
Germany

Certificate

Preliminary Values

RVMT-BM-1

Black Mass Powder

Element	Mass Fraction [g/100g]	Exp. Uncertainty [g/100g]	n Data sets
Li	4.04	0.12	20
Ni	28.25	0.85	23
Mn	1.87	0.04	23
Co	4.01	0.11	23
C	40.06	0.47	7
Al	0.276	0.017	12
Cu	0.074	0.007	16
Fe	0.012	0.001	15

Informative Values

Element	Mass Fraction [g/100g]	Exp. Uncertainty [g/100g]
O	19.59	1.12
P	0.033	0.022
F	0.35	0.06
S	0.03	0.02
Si	0.009	0.003
Zr	0.152	0.013
	[mg/kg]	**[mg/kg]**
Cr	14	6
Na	597	26
Mg	12.4	0.6
Ca	27	4

The preliminary and informative values represent the unweighted means of accepted data sets. An acceptable dataset 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 lacked either sufficiently low uncertainty, homogeneity or a sufficient number of accepted data sets (< 5).

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Glass bottle and pressed pellet serial numbers: {SERIENNUMMER}

Date of dispatch: {LIEFERDATUM}

This certificate is pending approval upon completion of the entire certification process estimated in Q3 of 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 nickel-manganese 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 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 clock- and counter clockwise 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 protection gear is advised.

Minimal sample size
The minimal 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] and are traceable to the base units of SI via calibrations performed from pure metals or stoichiometric compounds or with traceable commercial solutions.

Further Information
A detailed report on the certification of the reference material will be available as soon as all data have been acquired and evaluated. Completion is estimated within Q3 of 2026.

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 (Jingling Co., Ltd., China)
Aurubis AG Hamburg
BASF Batt.Mat.Rec. 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 University of Münster
PowerCo SE
SGS Chemie-, Industrie- und Spezialanalytik GmbH
SGS Institut Fresenius GmbH
SPECTRO Analytical Instruments GmbH
ThermoFisher Bremen GmbH
Umicore AG & Co. KG

Document History

Version	*Date*	*Changes applied*
1.0	16.06.2026	First publication of preliminary 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.*