National Institute of Standards and Technology
U.S. Department of Commerce

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Reference Material 8260

Infant Nutritional Formula
(hydrolyzed milk-based)

REFERENCE MATERIAL INFORMATION SHEET

Purpose: This reference material (RM) is intended for harmonizing measurements of nutrients and contaminants in infant formulas, adult nutritionals, or similar materials.

Description: A unit of RM 8260 consists of one can of powdered infant formula. Each can contains approximately 400 g of material.

Non-Certified Values: National Institute of Standards and Technology (NIST) non-certified values are best estimates based on currently available information. However, they do not meet NIST's criteria for certification. Non-certified values should not be used to establish metrological traceability to the International System of Units (SI) or other higher-order reference system [1].

Non-certified values on an as-received basis are provided in Table 1. The non-certified values for elements and vitamins are based on replicate measurements provided by the material manufacturer. The non-certified value for chlorate is based on results from an interlaboratory comparison [2]. These non-certified values are metrologically traceable to the materials and procedures used in their determination.

Table 1. Non-Certified Values for Selected elements, Vitamins, and Chlorate in RM 8260

Measurand	Mass Fraction[a,b] (mg/100 g)
Calcium (Ca)	421.9 ± 2.9
Manganese (Mn)	0.11770 ± 0.00083
Zinc (Zn)	4.737 ± 0.020
Free Vitamin B_6	0.4396 ± 0.0052
Vitamin E Acetate	16.21 ± 0.30
Chlorate	0.0281 ± 0.0032

[a] These values are expressed as $x \pm 2u(x)$, where x is the value and $u(x)$ is the standard uncertainty of x. The standard uncertainty combines between-laboratory reproducibility and between-can heterogeneity. While the best estimate of the mass fraction for both measurands lies within the interval $x \pm 2u(x)$, this interval may not include the true value. For guidance in propagating this uncertainty, see reference 3.

[b] The values for calcium, manganese, and zinc were determined using a sample size of 0.5 g. The values for free vitamin B_6 and vitamin E acetate were determined using a sample size of 25 g. For chlorate determinations, a minimum sample size of 1 g is recommended.

Period of Validity: The non-certified values are valid within the measurement uncertainty specified until **01 December 2023**. The value assignments are nullified if the material is stored or used improperly, damaged, contaminated, or otherwise modified.

Maintenance of Non-Certified Values: NIST will monitor this material to the end of its period of validity. If substantive technical changes occur that affect the assigned values before the expiration of this information sheet, NIST will notify the purchaser. Registration (see attached sheet or register online) will facilitate notification. Before making use of any of the values delivered by this material, users should obtain the most recent version of this documentation, available free of charge at https://www.nist.gov/srm.

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Safety: RM 8260 is intended for laboratory use only, not for human consumption.

Storage: RM 8260 should be stored at controlled room temperature (20 °C to 25 °C) in an unopened can until needed. An open can be retested for up to one month after opening, provided that the open can is resealed and stored at controlled room temperature (20 °C to 25 °C).

Use: Prior to removal of a test portion for analysis, the contents of a can of material should be mixed thoroughly. Test portion sizes should be appropriate to the measurands and analytical methods selected.

Homogeneity Assessment: The homogeneity of RM 8260 was assessed as part of the value assignment for elements and vitamins as described in Table 1. Analysis of variance of 10 replicate measurements across the batch at a 5 % significance showed no statistically significant heterogeneity. Homogeneity of other constituents was not assessed.

Other Information of Potential Interest: Additional information from the manufacturer of RM 8260 is provided in the Appendix. The amounts reported in the tables are the result of a single analytical measurement of the defined measurand. Data in the appendix may be of interest to the RM user, but insufficient information is available to assess the uncertainty associated with the value, therefore no uncertainty is provided. This information cannot be used to establish metrological traceability to the SI or other higher-order reference system.

REFERENCES

[1] Beauchamp, C.R.; Camara, J.E.; Carney, J.; Choquette, S.J.; Cole, K.D.; DeRose, P.C.; Duewer, D.L.; Epstein, M.S.; Kline, M.C.; Lippa, K.A.; Lucon, E.; Phinney, K.W.; Polakoski, M.; Possolo, A.; Sharpless, K.E.; Sieber, J.R.; Toman, B.; Winchester, M.R.; Windover, D.; *Metrological Tools for the Reference Materials and Reference Instruments of the NIST Material Measurement Laboratory*; NIST Special Publication 260-136; U.S. Government Printing Office: Washington, DC (2020); available at https://nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.260-136-2020.pdf (accessed Feb 2021).

[2] Barber, C.A.; Burdette, C.Q.; Hayes, H.V.; Luvonga, C.; Phillips, M.M.; Rimmer, C.A.; Wood, L.J.; Yu, L.L.; *NIST Health Assessment Measurements Quality Assurance Program: Exercise 5 Final Report*; NIST Internal Report 8343; National Institute of Standards and Technology, Gaithersburg, MD (2020); available at https://nvlpubs.nist.gov/nistpubs/ir/2021/NIST.IR.8343.pdf (accessed Feb 2021).

[3] Possolo, A.M.; *Evaluating, Expressing, and Propagating Measurement Uncertainty for NIST Reference Materials*; NIST Special Publication (NIST SP) 260-202 (2020); available at https://nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.260-202.pdf (accessed Feb 2021).

Certificate Revision History: 25 February 2021 (Homogeneity assessment added; editorial changes); 04 February 2021 (Change of Folic Acid value in Appendix A; editorial changes); 26 January 2021 (Original certificate date).

Certain commercial equipment, instruments, or materials may be identified in this Reference Material Information Sheet to adequately specify the experimental procedure. Such identification does not imply recommendation or endorsement by the National Institute of Standards and Technology, nor does it imply that the materials or equipment identified are necessarily the best available for the purpose.

Users of this RM should ensure that the Reference Material Information Sheet in their possession is current. This can be accomplished by contacting the Office of Reference Materials 100 Bureau Drive, Stop 2300, Gaithersburg, Maryland 20899-2300; telephone (301) 975-2200; e-mail srminfo@nist.gov; or via the Internet at https://www.nist.gov/srm.

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APPENDIX A
Additional Information Provided by the Manufacturer

Vitamins and Related Compounds

Measurand	Amount (mg/100 g)	Measurand	Amount (mg/100 g)
Vitamin A (Total)	0.740	Vitamin B_1	0.86
Vitamin D_3	0.011	Vitamin B_2	1.2
Vitamin K	0.088	Vitamin B_3 (Niacin)	6.4
		Pantothenic Acid	3.3
Carnitine	9.0	Biotin	0.033
Choline	160	Folic Acid	0.11
		Vitamin B_{12}	0.0029
Inositol	40	Vitamin C	250

Elements

Measurand	Amount (mg/100 g)	Measurand	Amount (mg/100 g)
Chloride (Cl)	380	Magnesium (Mg)	36
Copper (Cu)	0.50	Phosphorus (P)	220
Iodine (I)	0.120	Potassium (K)	660
Iron (Fe)	9.1	Selenium (Se)	0.025

Proximates

Measurand	Amount (%)	Measurand	Amount (%)
Fat	27	Moisture	2
Protein	12	Total Solids	98

Nucleotides

Measurand	Amount (mg/100 g)	Measurand	Amount (mg/100 g)
Adenosine monophosphate	7.1	Guanosine monophosphate	2.5
Cytidine monophosphate	11	Uridine monophosphate	6.5

Amino Acids

Measurand	Amount (g/100 g)	Measurand	Amount (g/100 g)
L-Alanine	0.64	L-Methionine	0.27
L-Arginine	0.30	L-Phenylalanine	0.42
L-Aspartic acid	1.4	L-Proline	0.74
Cystine	0.34	L-Serine	0.68
L-Glutamic acid	2.2	Taurine	0.044
L-Glycine	0.25	L-Threonine	0.90
L-Histidine	0.23	L-Tryptophan	0.26
L-Isoleucine	0.78	L-Tyrosine	0.38
L-Leucine	1.3	L-Valine	0.71
L-Lysine	1.2		

Oligosaccharides and Sugars

Measurand	Amount (g/100 g)	Measurand	Amount (g/100 g)
Glucose	0.12	2'-Fucosyllactose (2’-FL)	0.21
Lactose	37	Total Sugars	38
Maltose	0.71		

Fatty Acids

Measurand		Amount (%)
Hexanoic Acid (C6:0)	Caproic Acid	0.022
Octanoic Acid (C8:0)	Caprylic Acid	0.32
Decanoic Acid (C10:0)	Capric Acid	0.26
Dodecanoic Acid (C12:0)	Lauric Acid	2.0
Tetradecanoic Acid (C14:0)	Myristic Acid	0.89
Pentadecanoic Acid (C15:0)		0.011
Hexadecanoic Acid (C16:0)	Palmitic Acid	4.9
(*Z*)-9-Hexadecenoic Acid (C16:1 n-7)	Palmitoleic Acid	0.033
Heptadecanoic Acid (C17:0)	Margaric Acid	0.02
Octadecacanoic Acid (C18:0)	Stearic Acid	0.95
(E)-9-Octadecenoic Acid (C18:1-9t)	*trans*-Elaidic Acid	0.025
(Z)-9-Octadecenoic Acid (C18:1 n-9)	Oleic Acid	7.2
(Z,Z)-9,12-Octadecadienoic Acid	Linoleic Acid	5.4
(Z,E)-9,12-Octadecadienoic Acid (C18:2)		0.016
(E,Z)-9,12-Octadecadienoic Acid (C18:2)		0.019
(Z,Z,Z)-9,12,15-Octadecatrienoic Acid (C18:3 n-3)	α-Linolenic Acid	0.60
(Z,E,Z)-9,12,15-Octadecatrienoic Acid (C18:3)		0.029
(E,Z,Z)-9,12,15-Octadecatrienoic Acid (C18:3)		0.038
Eicosanoic Acid (C20:0)	Arachidic Acid	0.066
(Z)-9-Eicosenoic Acid (C20:1 n-11)	Gadoleic Acid	0.036
(Z,Z,Z,Z)-5,8,11,14-Eicosatetraenoic Acid (C20:4 n-6)	Arachidonic Acid	0.082
Docosanoic Acid (C22:0)	Behenic Acid	0.043
(Z,Z,Z,Z,Z,Z)-4,7,10,13,16,19-Docosahexaenoic Acid (C22:6 n-3)	DHA	0.079
Tetracosanoic Acid (C24:0)	Lignoceric Acid	0.023
Total Fat as Triglycerides		24
Saturated Fat		9.5
cis-Monounsaturated Fat		7.2
Trans Fat		0.13
cis-Polyunsaturated Fat		6.2
Total Fat as Fatty Acids		23
Total Linolenic acid		0.60
Total Omega-3 Fatty Acids		0.68
Total Omega-6 Fatty Acids		5.5
Total Omega Fatty Acids		6.2
Sum of Trans and Saturated Fat		9.6

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