



DORM-2

Dogfish Muscle Certified Reference Material for Trace Metals

The following table shows those elements for which certified values have been established for the dogfish (*Squalus acanthias*) reference material. Certified values are based on results of determinations by at least two independent methods of analysis. The uncertainties represent 95 percent tolerance limits for an individual sub-sample of 250 mg or greater.

TRACE ELEMENTS (milligrams/kilogram)

Aluminum (d,g,i)	10.9	±	1.7
Arsenic (d,g,h,x)	18.0	±	1.1
Cadmium (g,p)	0.043	±	0.008
Cobalt (d,g)	0.182	±	0.031
Chromium (g,i,p)	34.7	±	5.5
Copper (g,i,p,x)	2.34	±	0.16
Iron (g,i,p,x)	142	±	10
Lead (g,p)	0.065	±	0.007
Manganese (d,g,i)	3.66	±	0.34
Mercury (c,p)	4.64	±	0.26
Nickel (g,i,p)	19.4	±	3.1
Selenium (g,p)	1.40	±	0.09
Silver (g,p)	0.041	±	0.013
Thallium (p)	(0.004)*		
Tin (p)	(0.023)*		
Zinc (f,g,i,p)	25.6	±	2.3
Methylmercury (as Hg) (e,t)	4.47	±	0.32
Arsenobetaine (as As) (l,m)	16.4	±	1.1
Tetramethylarsonium (as As) (l)	0.248	±	0.054

* information value only

Coding

The coding refers only to the ultimate method of analyte determination. No mention is made here regarding the various methods of sample preparation, decomposition and possible analyte separation prior to determination within each coded method.

- c - Cold vapour atomic absorption spectrometry.
- d - Inductively coupled plasma mass spectrometry (ICPMS)
- e - Cold vapour microwave induced plasma atomic emission spectrometry
- f - Flame atomic absorption spectrometry.
- g - Graphite furnace atomic absorption spectrometry.
- h - Hydride generation atomic absorption spectrometry.
- i - Inductively coupled plasma atomic emission spectrometry.
- l - High-performance liquid chromatography ICPMS
- m - Ion spray mass spectrometry
- p - Isotope dilution inductively coupled plasma mass spectrometry.
- t - Gas chromatography - electron capture detection
- x - X-ray fluorescence spectrometry

This reference material is primarily intended for use in the calibration of procedures and the development of methods used for the analysis of marine animals and materials with a similar matrix.

There appear to be elevated concentrations of iron, chromium and nickel in DORM-2 indicating the possible contamination of this material by stainless steel during its preparation. The mercury concentration of this certified reference material (CRM) is also relatively high but it is almost all organomercury and was probably in the dogfish muscle to start with.

Storage and Sampling

This material should be kept tightly closed in the original bottle and should be stored in a cool location, away from any intense radiation sources such as ultraviolet lamps and sunlight. The bottle should be well mixed by rotation and shaking prior to use, and tightly closed immediately thereafter.

Homogeneity

This material was tested for homogeneity at the National Research Council (NRC) in Ottawa. Also, randomly selected bottles were used for the analytical determinations by the NRC laboratory and the collaborating laboratories.

Results from different bottles indicated no significant differences compared to results from sub-samples within bottles. It is assumed, then, that all bottles of this material is essentially of the same composition. The homogeneity is warranted by NRC for samples of 250 mg weight and above for the elements listed on the first page. There is other evidence which supports homogeneity for some of the analytes down to the level of 25 mg samples.

Instructions for Drying

DORM-2 can be dried to constant weight by:

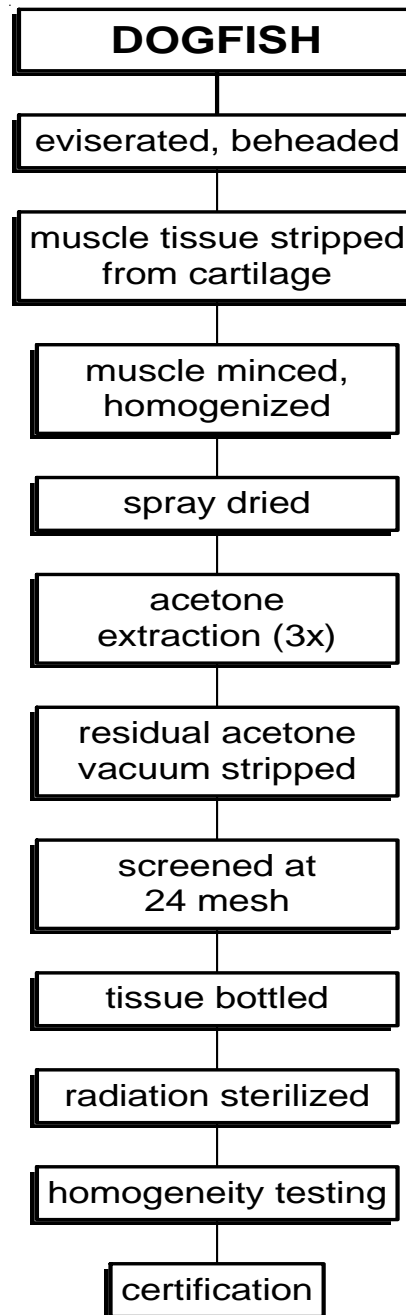
- (1) drying at reduced pressure (e.g. 50 mm Hg) at room temperature in a vacuum desiccator over magnesium perchlorate for 24 hours.
- (2) vacuum drying (about 0.5 mm Hg) at room temperature for 24 hours.

Both of these methods were used to obtain a conversion factor to produce the "dry weight" results listed on the first page.

Preparation of Materials

This reference material was processed at the Canadian Institute for Fisheries Technology, Technical University of Nova Scotia, Halifax. The preparation scheme is described below in the schematic drawing.

The procedure does not result in totally defatted materials. DORM-2 contains about 5 percent fat.



Stability

The predecessor CRM, DORM-1 has been periodically analyzed for more than fifteen years and has been both physically and chemically stable over that time. We expect similar behaviour from DORM-2.

Acknowledgements

This material was prepared following the advice of the NRC Committee on Marine Analytical Chemistry. The guidance of the members of the Committee is much appreciated.

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Updates

It is anticipated that as more data become available the established values may be updated and reliable values assigned to more elements.

Our web site at http://inms-ienm.nrc-cnrc.gc.ca/calserv/chemical_metrology_e.html will contain any new information.

Date of issue: January 1993

organoarsenic compounds certified: September 1999

Date of expiry: January 2010

The results listed in this certificate are traceable to the SI through gravimetrically prepared standards of established purity and international measurement intercomparisons. As such, they serve as suitable reference materials for laboratory quality assurance programs, as outlined in ISO/IEC 17025. This CRM is registered at the Bureau International des Poids et Mesures (BIPM) in Appendix C of the Comité International des Poids et Mesures database listing Calibration and Measurement Capabilities accepted by signatories to the Mutual Recognition Arrangement of the Metre Convention.

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