



CERTIFIED REFERENCE MATERIAL BCR[®] – 144R

CERTIFICATE OF ANALYSIS

SEWAGE SLUDGE FROM DOMESTIC ORIGIN			
Element	Mass fraction based on dry mass		Number of accepted sets of results p
	Certified value ¹⁾ [mg/kg]	Uncertainty ²⁾ [mg/kg]	
Total content			
Cd	1.82	0.10	11
Co	15.0	0.6	7
Cr	104.3	2.4	10
Cu	308	7	8
Hg	3.14	0.23	3
Mn	207.9	2.5	10
Ni	47.7	1.1	7
Pb	106	4	12
Zn	932	23	11
Element	Mass fraction based on dry mass		Number of accepted sets of results p
	Certified value ³⁾ [mg/kg]	Uncertainty ²⁾ [mg/kg]	
Aqua regia soluble content			
Cd	1.84	0.07	9
Co	13.3	0.5	7
Cr	90	6	9
Cu	300	11	9
Hg	3.11	0.18	5
Mn	189	6	9
Ni	44.9	1.5	9
Pb	96.0	1.6	9
Zn	919	16	9

¹⁾ Unweighted mean value of the means of p accepted sets of data, each set being obtained in a different laboratory and/or with a different method of determination. The certified values are traceable to the SI.
²⁾ Half-width of the 95 % confidence interval of the mean defined in ¹⁾ or ³⁾.
³⁾ Unweighted mean value of the means of p accepted sets of data, each set being obtained in a different laboratory and/or with a different method of determination. The certified values are traceable to the aqua regia extraction method as described in the report (DIN 38414-S7).

This certificate is valid for one year after purchase.

Sales date:

The minimum amount of sample to be used is 50 mg.

NOTE

This material has been certified by BCR (Community Bureau of Reference, the former reference materials programme of the European Commission). The certificate has been revised under the responsibility of IRMM.

Brussels, February 1996
Latest revision: April 2007

Signed:

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Additional Material Information	
Major Compounds	Mass fraction [g/kg] ¹⁾
SiO ₂	124.5
MgO	14.5
Al ₂ O ₃	89.5
TiO ₂	3.10
Fe ₂ O ₃	8.0
P ₂ O ₅	54.3
K ₂ O	8.0

¹⁾ Determination with X-ray fluorescence spectrometry

DESCRIPTION OF THE SAMPLE

The sample consists of about 50 g of powdered sewage sludge from domestic origin (particle size < 90 µm) in brown glass bottles provided with a polyethylene insert and a screw cap.

ANALYTICAL METHOD USED FOR CERTIFICATION

A wide range of sample treatment methods was applied as necessary, e.g. digestion with mixtures of oxidising acids; addition of HF was mandatory for complete digestion of the material.

Methods of final determination were:

- Cold vapour atomic absorption spectrometry
- Differential pulse anodic stripping voltammetry
- Differential pulse cathodic stripping voltammetry
- Electrothermal atomic absorption spectrometry
- Energy dispersive X-ray fluorescence spectrometry
- Flame atomic absorption spectrometry
- Inductively coupled plasma atomic emission spectrometry
- Inductively coupled plasma mass spectrometry
- Instrumental neutron activation analysis
- Isotope dilution mass spectrometry
- Isotope dilution inductively coupled plasma mass spectrometry
- Neutron activation analysis with radiochemical separation

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SAFETY INFORMATION

The usual laboratory safety precautions apply.

INSTRUCTIONS FOR USE

The sample should be used as it is from the bottle. Before a bottle is opened, it should be shaken manually for at least 5 minutes so that the material is re-homogenised.

The correction to dry mass must be determined on a separate portion taken at the same time of the analysis from the same bottle. It can be done by drying in an oven at 105 °C until constant mass is attained (successive weighing should not differ by more than 0.2 g).

Treatment with HF is recommended for the determination of total contents.

The digestion procedure used for the determination of the aqua regia soluble contents (DIN 38414-S7) is described in detail in the certification report.

The reference material is intended to verify the performance of a method and not to calibrate a method.

STORAGE

The closed bottle should be stored in a dry place at a maximum temperature of 20 °C. Once opened, the bottle should be stored closed in a dry desiccator; direct prolonged exposure to sunlight should be avoided.

However, the European Commission cannot be held responsible for changes that happen during storage of the material at the customer's premises, especially of opened samples.

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NOTE

A technical report on the production of BCR-144R is available on the internet (<http://www.irmm.jrc.be>). A paper copy can be obtained from IRMM on request.