



# CERTIFIED REFERENCE MATERIAL BCR<sup>®</sup> – 616

## CERTIFICATE OF ANALYSIS

MAJOR ELEMENTS IN ARTIFICIAL GROUNDWATER			
Element	Mass fraction [mg·kg <sup>-1</sup> ]		P
	Certified value <sup>1)</sup>	Uncertainty <sup>2)</sup>	
Ca	38.5	0.9	17
Cl	49.8	1.0	11
Mg	23.9	0.3	17
Mn	0.0197	0.0007	13
Na	61.5	0.7	17
NO <sub>3</sub>	50.4	0.9	10
PO <sub>4</sub>	3.36	0.13	11
SO <sub>4</sub>	57.3	1.1	10

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.  
2) Half-width of the 95 % confidence interval of the mean defined in (1). When the reference material is used to assess the performance of a procedure, the user should refer to the recommendations of the certification report.

This certificate is valid for one year after purchase.

Sales date:

The material is a true solution and has been proven homogeneous for sample intakes of 20 µL and above.

### DESCRIPTION OF THE SAMPLE

The material consists of an artificial groundwater sample at pH 6.0 in a glass ampoule containing about 75 ml. Additional information on the preparation, the certified and indicative values is given in the certification report.

### 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, November 1997  
Revised: February 2007

Signed: \_\_\_\_\_

Prof. Dr. Hendrik Emons  
Unit for Reference Materials  
EC-JRC-IRMM  
Retieseweg 111  
2440 Geel, Belgium

## **ANALYTICAL METHOD USED FOR CERTIFICATION**

Methods of final determination were:

- Capillary zone electrophoresis (Cl, NO<sub>3</sub>, SO<sub>4</sub>)
- Electrothermal atomic absorption spectrometry (Fe, Mg, Mn)
- Flame atomic absorption spectrometry (Ca, Fe, Mg, Na)
- Flame atomic emission spectrometry (Na)
- High resolution inductively coupled plasma mass spectrometry (Ca, Fe, Mg, Mn)
- Ion chromatography (Ca, Cl, Fe, Mg, NO<sub>3</sub>, PO<sub>4</sub>, Na, SO<sub>4</sub>)
- Inductively coupled plasma emission spectrometry (Ca, Fe, Mg, Mn, Na, SO<sub>4</sub>)
- Inductively coupled plasma mass spectrometry (Ca, Mg, Mn, Na)
- Potentiometry (Cl)
- Visible light or U.V. spectrophotometry (Cl, NO<sub>3</sub>, PO<sub>4</sub>, SO<sub>4</sub>)

## **PARTICIPANTS**

### **Preparation, homogeneity and stability**

- Empresa Portuguesa das Águas Livres S.A., Lisbon (PT)

### **Analyses**

- Aristotle University, Lab. of Analytical Chemistry, Thessaloniki (GR)
- CNR, Istituto di Ricerca sulle Acque, Brugherio (IT)
- CNR, Istituto Italiano di Idrobiologia, Pallanza (IT)
- CNRS, Service Central d'Analyse, Vernaison (FR)
- Compagnie Générale des Eaux, Anjou Recherche, Maisons-Lafitte (FR)
- CSIC, Instituto J. Almera, Barcelona (ES)
- Empresa Portuguesa das Águas Livres S.A., Lisbon (PT)
- GSF-Forschungszentrum für Umwelt und Gesundheit, Oberschleissheim (DE)
- Institut Scientifique de Service Public, Liège (BE)
- KIWA N.V., Nieuwegein (NL)
- Lyonnaise des Eaux, CIRSEE, Le Pecq (FR)
- Swedish University of Agricultural Sciences (SE)
- Technologiezentrum Wasser, Karlsruhe (DE)
- Universidad Complutense, Depto. de Química Analítica, Madrid (ES)
- Universiteit Gent, INW, Gent (BE)
- Water Quality Institute, Hørsholm (DK)
- Yorkshire Water, Alcontrol UK, Rotherham (GB)

## **SAFETY INFORMATION**

The usual laboratory safety measures apply.

## **INSTRUCTIONS FOR USE**

The sample must be used as it is from the ampoule. It is recommended that the reference material be analysed only within a day after opening the ampoule.

## **STORAGE**

The ampoules may be stored at a temperature of + 25 °C or below.

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.

## **LEGAL NOTICE**

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## **NOTE**

A technical report on the production of BCR-616 is available on the internet (<http://www.irmm.jrc.be>). A paper copy can be obtained from IRMM on request.