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Certified reference materials for particle size measurements

Reference materials for particle size or for particle size distributions are available which cover the size range from 20 nm to 5 mm.

Suspensions of latex spheres are available, the diameter of which has been established in an absolute way by microscopy and is hence traceable to the International System of Units.

Method specific size values (Stokes' diameter, equivalent volume diameter) were assigned to a series of quartz powder materials.

Three certified reference materials for particle sizes in the nanoscale-range are available.

Quartz materials certified for their particle size distribution (mm to mm range)

Code	Material	Certified particle size distribution
BCR-066	Quartz powder (10 g)	Stokes' diameter ranging from 0.35 to 3.50 µm
BCR-070	Quartz powder (10 g)	Stokes' diameter ranging from 1.20 to 20 µm
BCR-067	Quartz powder (10 g)	Stokes' diameter ranging from 2.40 to 32 µm
BCR-069	Quartz powder (10 g)	Stokes' diameter ranging from 14 to 90 µm
BCR-130	Quartz powder (50 g)	Equivalent volume diameter ranging from 50 to 220 µm
BCR-068	Quartz sand (100 g)	Equivalent volume diameter ranging from 160 to 630 µm
BCR-131	Quartz powder (200 g)	Equivalent volume diameter ranging from 480 to 1800 µm
BCR-132	Quartz Gravel (700 g)	Equivalent volume diameter ranging from 1400 to 5000 µm

Confidence in measurements

All certificates and detailed production information can be found at https://crm.irmm.jrc.ec.europa.eu

ERM European Reference Materials

BCR

https://ec.europa.eu/jrc/

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Latex materials certified for their particle size (low µm range)

Code	Material	Certified particle size
BCR-165	Suspension of latex particles (2 mL; 0.2 g/L solids)	(2.223 ± 0.013) µm
BCR-166	Suspension of latex particles (2 mL; 2 g/L solids)	(4.821 ± 0.019) µm
BCR-167	Suspension of latex particles (2 mL; 1.4 g/L solids)	(9.475 ± 0.018) µm

Suspensions of silica nanoparticles

ERM-FD100 is a certified reference material consisting of colloidal silica nanoparticles suspended in a water-based solution.

ERM-FD100	Equivalent spherical diameter
Intensity-weighted harmonic mean diameter (DLS)	19.0 ±0.6 nm
Intensity-based modal Stokes diameter (CLS)	20.1 ±1.3 nm
Number-based modal diameter (EM)	19.4 ± 1.3 nm
Intensitiy-weighted mean diameter (SAXS)	21.8 ± 0.7 nm
Equivalent spherical diameter, volume-weighted mean (SAXS)	(20.4 ± 1.6) nm
zeta-Potential	(-43 ± 22) mV

ERM-FD304 is a certified reference material consisting of colloidal silica nanoparticles suspended in a water-based solution. It is a little less monodisperse than ERM-FD100.

ERM-FD304	Equivalent spherical diameter
Scattering intensity-weighted harmonic mean diameter (DLS)	42.1 ± 0.6 nm
Extinction intensity-based modal Stokes diameter (CLS)	33.0 ± 3.0 nm
Number-based modal diameter (EM)	(27.8 ± 1.5) nm

ERM-FD102 is a certified reference material consisting out of a mixture of two monomodal populations of silica nanoparticles suspended in aqueous solution.

ERM-FD102	Equivalent diameter	
	Size class A	Size class B
Scattering intensity-weighted arithmetic mean hydromatic diameter (DLS)	17.8 ± 1.5 nm	88.5 ± 2.2 nm
Extinction intensity-weighted modal Stokes'diameter (CLS)	23.9 ± 2.0 nm	88 ± 7 nm
Number-weighted modal area-equivalent diameter (TEM and SEM)	18.2 ± 1.6 nm	84.0 ± 2.1 nm
Number-weighted median area-equivalent diameter (TEM and SEM)	18.3 ± 1.7 nm	83.3 ± 2.3 nm
Number-weighted mean hydrodynamic diameter (PTA)	-	(82 ± 4) nm
Number-weighted modal maximum particle height (ATM)	(16.9 ±1.8) nm	(80 ± 6) nm

(Values in brackets are not certified.)

How to order reference materials

From JRC in Geel

Tel.: +32 14 571 705 • Fax: +32 14 590 406 • https://ec.europa.eu/jrc/en/reference-materials • E-mail: jrc-irmm-rm-distribution@ec.europa.eu

From authorised distributors

LGC Standards GmbH (DE)
http://www.lgcstandards.com/
E-mail: de@lgcstandards.com

Sigma-Aldrich Chemie GmbH (CH)
http://www.sigmaaldrich.com/irmm
E-mail: flukatec@sial.com

Sigma-Aldrich RTC Inc. (USA)
http://www.RT-Corp.com
E-mail: RTCSalesgroup@sial.com

ARMI (USA)
http://www.armi.com
E-mail: Info@ARMI.com

Industrial Analytical (RSA)
http://www.industrialanalytical.co.za
E-mail: info@industrialanalytical.co.za

Accredited CRM Producer: the JRC-IRMM is accredited to ISO Guide 34:2009 for the production of reference materials under the code BELAC 268-RM

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