Designation Certificate

Nanomaterial Standardization and Certification Committee, Incorporated association, Clayteam

Takeo Ebina, Dr., Chairman

This document certifies that the following laboratory possesses the capabilities shown below to measure the characteristics of clay nanoplate products and is hereby designated as an approved testing laboratory. The characteristics and their measurement methods conform to ISO/TS 21236-2:2021.

Designation number: 001-2

Certification Issued: June 9, 2025

Validity period: From June 9, 2025 to June 8, 2027

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KUNIMINE INDUSTRIES CO., LTD.

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Designation Details: The laboratory possesses the measurement capabilities outlined from Table 1 to Table 3.

Table 1

No.	Characteristics	Measurement methods	Typical values of characteristics	Measurement capability (note 1)		Note
				Absolute values	Relative values	
1	Mineral composition content	X-ray diffraction	See Table 2			
2	Chemical composition content	X-ray fluorescence	See Table 3			
3	Cation exchange capacity	Schollenberger method	111.7 meq/100 g	5.4 meq/100 g	4.8 %	(Note 2)
4	Particle size (Spherical equivalent)	Laser diffraction	2.33 μm (volumetric basis D50) 1.33 μm (number basis D50)	0.26 μm 0.13 μm	11 % 9.8 %	
		Dynamic light scattering	238 nm (volumetric basis D50) 217 nm (number basis D50)	49 nm 46 nm	20% 21%	
5	Loss on ignition	Gravimetry	6.10 wt%	0.15 wt%	2.5 %	
6	Methylene blue adsorption capacity	Filter paper method	146 mmol/100 g	4.1 mmol/100 g	2.8 %	

(Note 1) Measurement capability excluding mineral composition content is evaluated using Kunipia-F, a quality control material manufactured by KUNIMINE INDUSTRIES CO., LTD. As for mineral composition content, measurement capability is evaluated using BENGELNEXT NC manufactured by HOJUN Co., Ltd.

(Note 2) The values of measurement capability represent the reproducibility of the measurement results. The values represent the 95% confidence interval of the measurement results.

Table 2

No.	Characteristic	Measurement method	Chemical composition	Typical values of characteristics	Measurement capability (Note 1)		Note
					absolute values	relative values	
1	Mineral composition content	X-ray diffraction	Smectite	97.0 wt%	1.9 wt%	1.9 %	(Note 2)
			Crystballite	2.08 wt%	0.75 wt%	36 %	
			Calcite	0.76 wt%	-	-	(Note 3)
			Quartz	0.20 wt%	0.05 wt%	25 %	(Note 2)

(Note 3) The typical values of characteristics with horizontal bars in the measurement capability column are estimated values.

Table 3

No.	Characteristic	Measurement method	Chemical composition	Typical values of characteristics	Measurement capability (Note 1)		Note
					absolute values	relative values	
2	Chemical composition content	X-ray fluorescence	SiO_2	64.6 wt%	0.2 wt%	0.3 %	(Note 2)
			Al_2O_3	22.8 wt%	0.1 wt%	0.4 %	
			MgO	4.3 wt%	0.1 wt%	1.2 %	
			Na_2O	3.6 wt%	0.1 wt%	1.6 %	
			Fe_2O_3	3.0 wt%	0.1 wt%	4.7 %	
			CaO	0.93 wt%	0.04 wt%	3.8 %	
			SO_3	0.25 wt%	0.01 wt%	3.9 %	
			TiO_2	0.21 wt%	0.02 wt%	9.0 %	
			K_2O	0.13 wt%	0.004 wt%	3.0 %	
			BaO	0.10 wt%	-	-	(Note 3)
			MnO	0.03 wt%	-	-	
			SrO	0.02 wt%	-	-	
			P_2O_5	0.02 wt%	-	-	
			ZrO_2	0.02 wt%	-	-	
			Cl	0.02 wt%	-	-	

For the measurement procedure of each characteristic, please refer to the following link.

Measurement procedure:

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