

ANALYSENZERTIFIKAT

Analyses of Lot No: 1182819

Material designation

Material	Natural Zeolite
Chemical description	Hydrated aluminosilicate of alkali metals and alkaline earth metals
Mineral	Clinoptilolite
Structure	Tectosilicate
Empirical formula	$(Ca,K_2,Na_2,Mg)_4Al_8Si_{40}O_{96} \cdot 24H_2O$

Physical and mechanical properties

Softening temperature	1 260 °C	Porosity	24 - 32 %
Melting temperature	1 340 °C	Effective pore diameter	0.4 nm (4 angstrom)
Flow temperature	1 420 °C	Relative density	70%
Compression strength	33 MPa	Brightness	70%
Specific weight	2 200 - 2 440 kg/m ³	Mohs hardness	1.5 - 2.5
Volume weight	1 600 - 1800 kg/m ³	water absorbing capacity	34 - 36 %
Appearance and odour	grey-green, odourless	pH-value	6.8 - 7.2

Data on reactivity

Resistance	acid and base proof	Dangerous decomposition	none
Thermic stability	up to 450 °C	Dangerous polymerization	none
Solubility in water	none	Toxicity	nontoxic

Chemical composition

SiO ₂	65.0 - 71.3 %	MgO	0.6 - 1.2 %
Al ₂ O ₃	11.5 - 13.1 %	Na ₂ O	0.2 - 1.3 %
CaO	2.7 - 5.2 %	TiO ₂	0.1 - 0.3 %
K ₂ O	2.2 - 3.4 %	Hg	< 0,071 mg/kg**
Fe ₂ O ₃	0.7 - 1.9 %	As	1,02 mg/kg*
Pb	10,0 mg/kg *	Cd	0.040 mg/kg**
		Si/Al	4.8 - 5.4

*) ± 15% measurement uncertainty; **) ± 25% measurement uncertainty

Mineralogical composition (typical)

Clinoptilolite	86%	Quarz	2%
Cristobalite	6%	Feldspat	1%
Biotit	5%		

Ionic exchange capability

Total exchange	Ca ²⁺ 0.64 - 0.98 mol/kg	K ⁺	0.22 - 0.45 mol/kg
	Mg ²⁺ 0.06 - 0.19 mol/kg	Na ⁺	0.01 - 0.19 mol/kg
Partial exchange capacity		NH ₄ ⁺	min. 0.70 mol/kg
Total exchange capacity		NH ₄ ⁺	1.2 - 1.5 mol/kg
Water vapour sorption by dehydrated rock	at 20 °C and rel. humidity 52 %		75 - 85 g H ₂ O/kg
	at 20 °C and rel. humidity 98 %		135-145 g H ₂ O/kg

Microbiological testing

Aerob mesophile microbes:	<1.000/g
Eterobacteriaceen	<10/g
Escherichia coli	<10/g
Yeast	<100/g
Mould	<100/g
Salmonella	not detectable in 25g
Staphylococcus aureus	not detectable in 1g

Signature, Head of QM

Date 20.08.2019