NaCl (Sodium Chloride)

Sodium chloride (NaCl) is used in IR spectroscopy in the 0.25–16 µm wavelength range. NaCl is a hygroscopic material therefore the optical components require storage in desiccator or in sealed package with silica gel in a warm room and the polished surfaces must be protected from the moisture by exposing to only a dry atmosphere while using. Sodium chloride can be used to temperatures up to 400°C. The material is sensitive to thermal shock.

Application
- IR/FTIR spectroscopy

Product types
- Plane-parallel windows and wedges
- Lenses

Specifications

Tab. 1. Typical specification of NaCl optical components

Specification	Typical	State-of-the-art
Sizes	See "Plane and Wedged Windows"	Up to 100 mm
Diameter tolerance, mm	+0/−0.25	RFQ
Thickness tolerance, mm	±0.25	RFQ
Thickness matching, mm	–	RFQ
Surface quality, scr/dig	60/40	RFQ
Surface flatness, ≈ @ 633 nm per inch*	2	RFQ
Parallelism (wedge tolerance)	5 arc min	RFQ
Coating	none	RFQ
Packaging	Typak®	

* For "thick" windows: while Diameter/Thickness ratio ≤8

Transmission spectrum

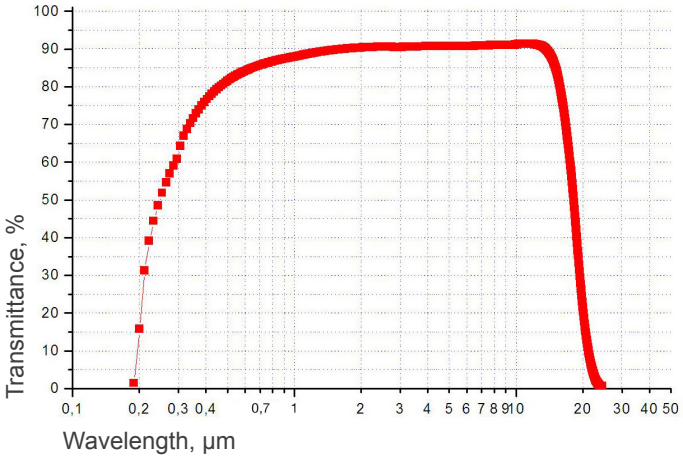

Fig. 1. Transmission spectrum of NaCl. The measurements were carried out on Perkin Elmer Lambda-35 spectrophotometer and on BrukerVertex-70 Fourier-spectrometer.

Tab. 2. Refractive index

λ, µm	n
0.35	1.58
0.37	1.57
0.46	1.56
0.51	1.55
0.68	1.54
1.25	1.53
4.50	1.52
7.30	1.51
9.50	1.50
10.60	1.49
12.00	1.48
13.10	1.47
14.20	1.46
15.10	1.45
16.00	1.44

Tab. 3. Optical properties

Transmission range, microns	0.25 – 16
Color	colorless
Reflection losses (2 surfaces) @ 11 µm, %	7.5
Absorption coefficient @ 3.8 µm, 10^{-4} cm^{-1}	<0.0002
Restrahlen peak, µm	50.1
dN/dT, 10^{-6}/C	−40.83

Tab. 5. Chemical stability / Solubility

in water (at 0°C)	35.7 g/100 cm^3, hygroscopic
in acids	insoluble in HCl
in organic solvents:	
glycerol	soluble
alcohol	slightly soluble

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Tab. 4. Physical and mechanical properties

Class/Structure		Cubic FCC, Fm3m, (100) cleavage
Density @300K, g/cm^3		2.17
Molecular Weight		58.45
Lattice constant, Å		5.65
Melting Point, °C		801
Thermal Conductivity @273K, W/(m×K)		1.15
Thermal Expansion @273K, 10^{-6}/C		44
Hardness, Knoop with 200g indenter	in (100)	18.2
	in (110)	15.2
Specific Heat Capacity, J/(kg×K)		854
Debye temperature, K		321
Dielectric Constant for 106 Hz @300K		5.9
Bandgap, eV		9.0
Young Modulus (E), GPa		39.98
Shear Modulus (G), GPa		12.61
Bulk Modulus (K), GPa		24.42
Elastic Coefficient		C11 = 48.7 C12 = 12.6 C44 = 12.75
Apparent Elastic Limit, MPa		2.4
Poisson Ratio		0.252

Please pay your attention that this article is for your information only. We do not supply NaCl in ingots as well as semi-finished products. Our standard products are polished parts.

For further information on our NaCl optical components please see the following brochures: “Plane and Wedged Windows”, “Packaging” or fill in the request form on our site.

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