

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 table in the article Plane Windows 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, λ @ 633nm per inch*	2	RFQ
Parallelism (wedge tolerance)	5 arc min	RFQ
Coating	none	protecting

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

Спектр пропускания

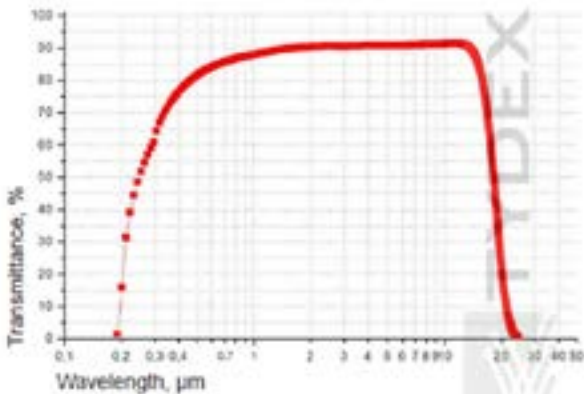


Fig. 1. The measurements were carried out on Perkin Elmer Lambda-35 spectrophotometer and on BrukerVertex-70 Fourier-spectrometer.

Tab.2. Refractive index

$\lambda, \mu\text{m}$	n	$\lambda, \mu\text{m}$	n	$\lambda, \mu\text{m}$	n
0.35	1.58	1.25	1.53	12.00	1.48
0.37	1.57	4.50	1.52	13.10	1.47
0.46	1.56	7.30	1.51	14.20	1.46
0.51	1.55	9.50	1.50	15.10	1.45
0.68	1.54	10.60	1.49	16.00	1.44

Tab.3. Optical properties

Transmission range, microns	0,25 — 16
Colour	Colourless
Reflection losses @ 11 μm (2 surfaces), %	7.5
Absorption coefficient, @ 3.8 μm , 10^{-4}cm^{-1}	<0.0002
dN/dT, $10^{-6}/\text{C}$	-40,83
Reststrahlen peak, μm	50.1

Tab.4. Physical and mechanical properties

Class / Structure	Cubic FCC, Fm3m, (100) cleavage
Density @300K, g/cm ³	2.17
Molecular Weight	58.45
Melting Point, °C	801
Thermal Conductivity @273K, W/(m×K)	1.15
Thermal Expansion @273K, $10^{-6}/\text{C}$	44
Hardness, Knoop with 200g indenter	18.2 (in 100) 15.2 (in 110)
Specific Heat Capacity, J/(kg×K)	854
Диэлектрическая проницаемость @300K для 1МГц	5.9
Debye temperature, K	321
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

Tab.5. Chemical stability / Solubility

in water (at 0 oC)	35,7 g/100cm ³ hygroscopic
in acids	insoluble in HCl
in organic solvents:	
alcohol	slightly soluble
glycerol	soluble

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 KCl optical components please see the following: Windows for IR-spectroscopy, Packaging or fill in Request Form at our website.