

KCl (Potassium Chloride)

Potassium chloride (KCl) is used in IR spectroscopy as well as in high power CO₂ laser applications. It refers to salt crystals (like KBr and NaCl). KCl is soft and stable to thermal influence monocrystal.



Due to material hygroscopicity the polished parts require storage in desiccator or in sealed package with silica gel in a warm room.

Application

- IR spectroscopy
- CO₂ laser optics

Product types

- Plane-parallel windows and wedges
- Lenses

Specifications

Tab. 1. Typical specification of KCl 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 | protecting |
| Packaging | Typak® | |

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

Transmission spectrum

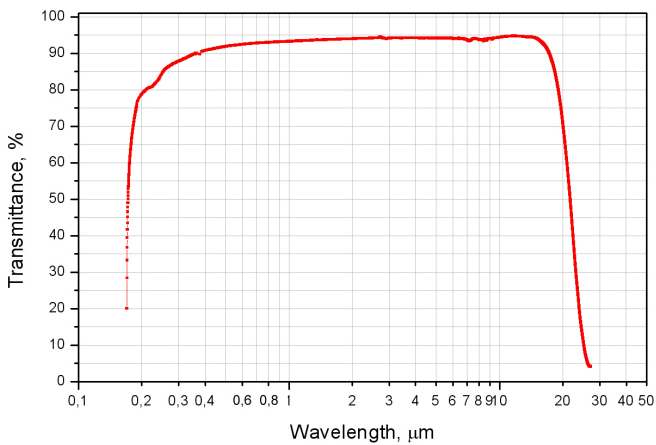


Fig. 1. Transmission spectrum of KCl. The measurements were carried out on Perkin Elmer Lambda-35 spectrophotometer and on BrukerVertex-70 Fourier-spectrometer.

Tab. 2. Refractive index

| $\lambda, \mu\text{m}$ | n |
|------------------------|--------|
| 0.20 | 1.7187 |
| 0.51 | 1.4962 |
| 1.18 | 1.4783 |
| 5.00 | 1.4705 |
| 6.00 | 1.4684 |
| 7.00 | 1.466 |
| 8.00 | 1.4629 |
| 9.00 | 1.4600 |
| 10.00 | 1.4564 |
| 11.00 | 1.4524 |
| 12.00 | 1.4480 |
| 13.00 | 1.4431 |
| 14.00 | 1.4378 |
| 15.00 | 1.4320 |
| 16.00 | 1.4256 |
| 17.00 | 1.4188 |
| 18.00 | 1.4113 |
| 19.00 | 1.4033 |
| 20.00 | 1.3947 |
| 21.00 | 1.3854 |
| 22.00 | 1.3754 |
| 23.00 | 1.3646 |
| 24.00 | 1.3530 |
| 25.00 | 1.3406 |
| 26.00 | 1.3272 |
| 27.00 | 1.3128 |
| 28.00 | 1.2973 |

Tab. 3. Optical properties

| | |
|--|-----------|
| Transmission range, microns | 0.22 – 21 |
| Color | colorless |
| Reflection losses (2 surfaces) @ 11 μm, % | 8.3 |
| Absorption coefficient @ 3.8 μm, 10 ⁻⁴ cm ⁻¹ | 1.6 |
| Reststrahlen peak, μm | 63.1 |
| dN/dT, 10 ⁻⁶ /C | -33.2 |



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Tab. 4. Physical and mechanical properties

| | | |
|--|--|-----|
| Class/Structure | Cubic FCC, NaCl type, Fm3m, (100) cleavage | |
| Density @300K, g/cm ³ | 1.98 | |
| Molecular Weight | 74.55 | |
| Melting Point, °C | 776 | |
| Thermal Conductivity @322K, W/(m×K) | 6.53 | |
| Thermal Expansion @300K, 10 ⁻⁶ /C | 36 | |
| Hardness, Knoop with 200g indenter | in (100) | 9.3 |
| | in (110) | 7.2 |
| Specific Heat Capacity, J/(kg×K) | 690 | |
| Debye temperature, K | 235 | |
| Dielectric Constant for 106 Hz @300K | 4.64 | |
| Bandgap, eV | 8.5 | |
| Young Modulus (E), GPa | 29.67 | |
| Shear Modulus (G), GPa | 6.24 | |
| Bulk Modulus (K), GPa | 17.36 | |
| Elastic Coefficient | C11=40.2, C12=6.7 C44=6.29 | |
| Apparent Elastic Limit, MPa | 2.3 (330psi) | |
| Poisson Ratio | 0.216 | |

Tab. 5. Chemical stability / Solubility

| | |
|----------------------|--|
| in water (at 0°C) | 34.7 g/100cm ³ , hygroscopic |
| in acids | soluble |
| in organic solvents: | |
| spirits | insignificantly soluble |

Please pay your attention that this article is for your information only. We do not supply KCl 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 brochures: "Plane and Wedged Windows", "Packaging" or fill in the request form on our site.



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