

KBr Potassium Bromide

Summary Description

KBr is the most commonly used material for commercial infrared spectroscopy. It has a relatively low refractive index which permits the design of very high quality beamsplitters. Impurities in the single crystal KBr ingots are usually caused by the atmosphere in which the ingot is grown. Although the impurity bands are weak they can cause problems because they are very narrow ($<6 \text{ cm}^{-1}$). Since FT-IR instruments are unable to ratio these bands perfectly, it is important to use only the purest KBr material available for use in beamsplitters. In good quality KBr the level of impurity bands is less than 1% for a typical beamsplitter thickness.

Advantages

1. Good spectral range
2. Refractive index match with many organic solvents when used as sample windows

Disadvantages

1. Water soluble and prone to fogging
2. Relatively softer material

Physical Data

Melting Point: 730 °C
 Density: 2.7533 g/cm³
 Solubility in H₂O: 53.48 g/100 g at 20 °C
 Hardness: 6 kg/mm²
 Appearance: Clear crystalline

Refractive Index¹

WAVELENGTH (Microns)	INDEX	WAVELENGTH (Microns)	INDEX
0.404656	1.589752	8.662	1.52903
0.508582	1.568475	9.724	1.52695
0.643847	1.555858	11.862	1.522
0.70652	1.552447	14.29	1.51505
1.12866	1.54258	17.4	1.5039
1.7012	1.53901	18.16	1.50076
2.44	1.53733	19.91	1.49288
3.419	1.53612	21.83	1.483114
6.238	1.53288	25.14	1.46324

Specific index listed; Generic: 1.52 @ 10 microns

Spectral Range

Short Wavelength Limit: 48,800 cm⁻¹ (1 mm)

Long Wavelength Limit: 345 cm⁻¹ (2 mm), 388 cm⁻¹ (4 mm)

Coatings

KBr can be relatively easily coated with high quality, wide bandwidth beamsplitter coatings. In addition, many different coating designs exist for improving the humidity resistance of the KBr. The better protective coatings have more and stronger absorption bands. The lower absorbing coatings offer less protection.

TYPICAL USES

- Beamsplitters in commercial FT-IR instruments
- Liquid and gas cell windows
- Un-cooled infrared detector windows
- When protectively coated, purged compartment windows
- In powdered form, substrate for ground sample pellets

Notes

Short and Long Wavelength Limits defined for which transmissivity is greater than 50% of stated crystal thickness.

1. Stephens, Pyle, Rodney & Spindler, *Journal of the Optical Society of America*, Vol. 43, p. 111-112, 1953

Mid-IR Transmission – 8 mm thick KBr window

