

# Optical Crystals

## Barium fluoride : BaF<sub>2</sub>

### Characteristic

- ◆ Barium fluoride exhibits a wide transmittance wavelength range of up to 13 μm in the infrared region, the widest among fluoride crystals.
- ◆ The crystalline material is physically and chemically stable, and is resistant to water and chemicals.



### Applied Example



Infrared lens

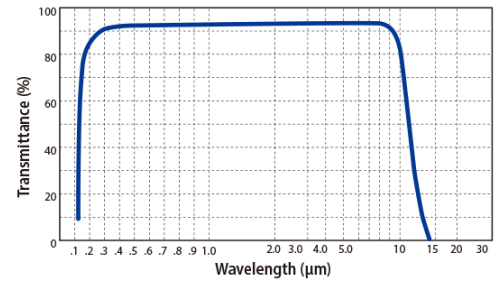


Infrared measuring device

### Features

Refractive Indices			Constants of Dispersion Formula			
n <sub>C</sub>	656.3 nm	1.47274	$n^2 - 1 = \frac{A_1 \lambda^2}{\lambda^2 - B_1^2} + \frac{A_2 \lambda^2}{\lambda^2 - B_2^2} + \frac{A_3 \lambda^2}{\lambda^2 - B_3^2}$			
n <sub>d</sub>	587.6 nm	1.47448			A <sub>1</sub>	6.43356 × 10 <sup>-1</sup>
n <sub>F</sub>	486.1 nm	1.47855			A <sub>2</sub>	5.06762 × 10 <sup>-1</sup>
n <sub>g</sub>	435.8 nm	1.48173	A <sub>3</sub>	3.8261		
Abnormal Dispersion			B <sub>1</sub>	5.7789 × 10 <sup>-2</sup>		
			B <sub>2</sub>	1.0968 × 10 <sup>-1</sup>		
V <sub>d</sub>	81.7		B <sub>3</sub>	4.63864 × 10 <sup>+1</sup>		
θ <sub>g,F</sub>	0.5473		(Reference) Malitson, I. H., <i>J. Opt. Soc. Am.</i> , 54, 628, 1964.			

### Transmittance



### Temperature Coefficients of Refractive Index

-dn/dT (× 10<sup>-6</sup> °C<sup>-1</sup>)

	0.767858 μm	r	0.6678149 μm	C	D	e	F	g	h
15~35 °C	15.40	15.35	15.20	15.20	15.20	15.20	15.20	15.00	15.05
35~55 °C	15.50	15.20	15.30	15.25	15.25	15.20	15.10	15.00	15.05

(Reference) Malitson, I. H., *J. Opt. Soc. Am.*, 54, 628, 1964.

## Physical Properties

Basic Physical Properties	
Name of crystal material	BaF <sub>2</sub>
Transmittance wavelength range (μm)	0.15~13
Color	Colorless
Density (g/cc)	4.83
Melting point (°C)	1280
Solubility (g/100gH <sub>2</sub> O) (30°C)	0.162
Molecular weight	175.36
Crystal system	Cubic
Crystal structure	Fluorite type
Cleavage plane	{ 1 1 1 }

Thermal Properties	
Thermal Expansion α (1/°C)(0°C)	18×10 <sup>-6</sup>
Thermal Conductivity λ (cal/cm·sec·°C)	2.8×10 <sup>-2</sup>
Specific Heat Cp (cal/g·°C)	0.098

Mechanical Properties	
Knoop Hardness Hk	82
Young's Modulus E (GPa)	66.1
Modulus of Rigidity G (GPa)	25.4
Poisson Ratio	0.343

## Processing specifications

BaF <sub>2</sub>	
Size	φ 10 - 120 mm
Curvature Radius <sup>*1</sup> Tolerance	< ±2 Fr (measurement wavelength; λ =546nm)
surface accuracy <sup>*1,2</sup>	< λ/2 (measurement wavelength; λ =633nm)
Surface roughness	< RMS 2.0 nm
Diameter tolerance	±0.01 mm
Thickness tolerance	±0.1 mm
Eccentricity	-
Appearance accuracy <sup>*1</sup>	Canon Optron's standards
Machined shape	Plane glass



\*1 Within 95% of Outer Diameter

\*2 Prototype-based

Depending on the shape, it may not meet the specifications listed on the left.  
For specifications other than those listed on the left, please inquire separately.

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