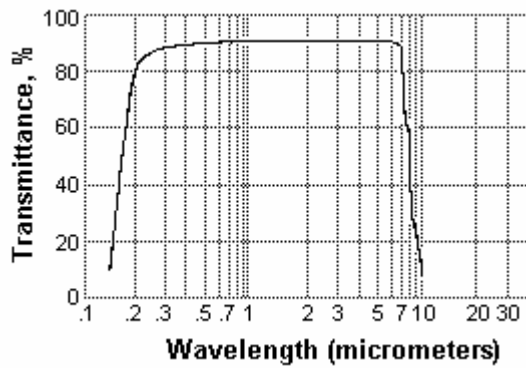


## Calcium Fluoride (CaF<sub>2</sub>)



Calcium Fluoride is used for optical windows, lenses and prisms in the 0.15  $\mu\text{m}$  - 9  $\mu\text{m}$  range. This material has found wide use in high power laser optics due to its low absorption. Polished surfaces are stable and will last several years under normal conditions. Due to its low refractive index, Calcium Fluoride can be used without anti-reflection coating.

Calcium fluoride is grown by vacuum Stockbarger technique. Material for IR use is grown using naturally mined fluorite, in large quantities at relatively low cost.

### OPTICAL PROPERTIES

Transmission Range	0.13 to 10 microns
Refractive Index	1.39908 at 5 microns
Reflection Loss	5.5% at 5 $\mu\text{m}$ (2 surfaces)
Reststrahlen Peak	35 microns
dN/dT	$-10.6 \times 10^{-6}/^{\circ}\text{C}$

### PHYSICAL PROPERTIES

Density	3.18 g/cm <sup>3</sup>
Melting Point	1360 $^{\circ}\text{C}$
Thermal Conductivity	9.71 W/(m*K)
Thermal Expansion	$18.85 \times 10^{-6}/^{\circ}\text{C}$
Hardness	Knoop 158.3 kg/mm <sup>2</sup> (100)
Specific Heat Capacity	854J/(kg K)
Dielectric Constant	6.76 at 1MHz
Young's Modulus (E)	75.8 GPa
Shear Modulus (G)	33.77 GPa
Bulk Modulus (K)	82.71 GPa
Elastic Coefficients	C11=164 MPa, C12=53 MPa, C44=33.7 MPa
Apparent Elastic Limit	36.54 MPa
Poisson Ratio	0.26

### CHEMICAL PROPERTIES

Solubility	0.0017g/100g water at 20 $^{\circ}\text{C}$
Molecular Weight	78.08
Class/Structure	Cubic (111) cleavage

<b>Wavelength, <math>\mu\text{m}</math></b>	0.19	0.21	0.25	0.33	0.41	0.88
<b>Refractive Index</b>	1.51	1.49	1.47	1.45	1.44	1.43
<b>Wavelength, <math>\mu\text{m}</math></b>	2.65	3.90	5.00	6.20	7.00	8.22
<b>Refractive Index</b>	1.42	1.41	1.40	1.38	1.36	1.34