

Sodium Fluoride (NaF)

MATERIALS DATA

Sodium Fluoride is produced by vacuum Stockbarger techniques. The Sodium Fluoride is very difficult to anneal and cleaves readily limiting the useful size of pieces to about 80mm. Sodium Fluoride polishes well but must be kept in dry air to maintain the quality of the surfaces and retain the deep UV transmission needed for Cerenkov radiation from this material.

APPLICATIONS: Sodium Fluoride has the lowest refractive index of all common optical materials which makes it of interest as a Cerenkov radiator in Particle Physics research. Crystran Ltd. has supplied Sodium Fluoride material which has been made into large arrays at CERN. It is used in Ring Imaging Cerenkov Counters (RICH)

Transmission Range	0.14 to 11 μ m
Refractive Index	1.3255 at 0.6 μ m
Reflection Loss	3.9% at 0.6 μ m
Absorption Coefficient	$1 \times 10^{-3} \text{ cm}^{-1}$ at 7 μ m @ 300K (1)
Reststrahlen Peak	35.8 μ m
dn/dT	$-13 \times 10^{-6} \text{ K}^{-1}$ at 293K
dn/d $\mu = 0$	1.7 μ m
Density	2.79 g/cc @20°C
Melting Point	980°C
Thermal Conductivity	3.746 W m $^{-1}$ K $^{-1}$ at 273K
Thermal Expansion	$36 \times 10^{-6} / \text{K}$ at 300K
Hardness	Knoop 60 in <100>
Specific Heat Capacity	1088 J Kg $^{-1}$ K $^{-1}$
Dielectric Constant	6 at 1 MHz
Youngs Modulus (E)	79.01 GPa
Shear Modulus (G)	12.70 GPa
Bulk Modulus (K)	47.9 GPa
Elastic Coefficients	$C_{11}=79.01$; $C_{12}=12.7$; $C_{44}=47.9$
Apparent Elastic Limit	3.2 MPa (Estimated)
Poisson Ratio	0.326
Solubility	4.22g/100g water at 18°C
Molecular Weight	42.0
Class/Structure	Cubic FCC, NaCl, Fm3m, (100) cleavage

(1) H.H.Li, Absorption Coefficients, Int.J.Therm, V1, No. 1, 1980



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μm	No	μm	No	μm	No
0.140	1.55	0.145	1.499	0.161	1.438
0.175	1.410	0.186	1.393	0.199	1.3805
0.203	1.3772	0.302	1.34232	0.405	1.33194
0.486	1.32818	0.546	1.3264	0.589	1.32549
0.707	1.32372	0.811	1.32272	0.912	1.32198
1.014	1.3215	2.000	1.3170	3.100	1.313
4.100	1.308	5.100	1.301	6.100	1.292
7.100	1.281	8.100	1.269	9.100	1.252
10.30	1.233	11.30	1.209	12.50	1.18
13.80	1.142	15.10	1.093	16.70	1.029

