Calcite ($CaCO_3$)

Calcite is mined naturally, not manufactured synthetically. Crystran Ltd has a stock of small calcite "rhombs" of good clear optical quality. Calcite cuts and polishes well.

APPLICATIONS: Calcite, or Iceland Spar, is a strongly birefringent material and is used for polarisers and retardation plates.

Transmission Range	0.3 to 2.3µm
Refractive Index	No 1.6654 at 0.51µm
Reflection Loss	11.7% at 0.51µm (2 surfaces)
Absorption Coefficient	n/a
Reststrahlen Peak	n/a
dn/dT	3 (para) 13 (perp) x 10^{-6} K^{-1} at 0.5µm
dn/dµ = 0	n/a
Density	2.71 g/cc
Melting Point	825°C (Decomposes)
Thermal Conductivity	5.526 (para) 4.646 (perp) W m^{-1} K^{-1} at 273K
Thermal Expansion	25 (para) 5.8 (perp) x 10^{-6} K^{-1} at 273K
Hardness	Knoop 155 Moh 3
Specific Heat Capacity	852 J Kg^{-1} K^{-1}
Dielectric Constant	8 (para) 8.5 (perp) at 10kHz at 293K
Youngs Modulus (E)	72.35 (perp) 88.19 (para) GPa
Shear Modulus (G)	35 GPa
Bulk Modulus (K)	129.53 GPa
Elastic Coefficients	C_{11}=137; C_{12}=45; C_{13}=45; C_{14}=21; C_{33}=79
Apparent Elastic Limit	4.83 MPa (700 psi)
Poisson Ratio	n/a
Solubility	0.0014g/100g water at 25°C
Molecular Weight	100.09
Class/Structure	Trigonal (hex), R3c, (1014) cleavage (1)

CLEAVAGE PLANE : *There can be confusion in the definition of the cleavage plane in calcite. Conventionally this has always been referred to as {1011} but recent papers on AFM studies use {1014}. Calcite cleaves between the bonds of the CO_3 groups (in the CO_3 layer). The CO_3 group are offset relative to each other and inclined to the c-axis giving 3 cleavage directions defining a rhomb. Following the {1011} nomenclature the unit cell requires ¼ the length of the c axis as measured from XRD (on a dimension 4 times longer). The correct Miller indices are {1014} but the conventional {1011} is often used in order not to confuse and for easier comparison.*

(1) Private Communication. J.A.Elliott. Material Science, University of Cambridge. 2011

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µm	No	Ne	µm	No	Ne
0.20	1.9028	1.5765	0.30	1.7196	1.5137
0.41	1.6801	1.4954	0.51	1.6653	1.4896
0.64	1.6550	1.4849	0.71	1.6521	1.4835
0.80	1.6487	1.4822	0.91	1.6458	1.4810
1.04	1.6428	1.4799	1.50	1.6346	1.4774
1.91	1.627	1.4757	2.10	1.622	1.4749