

Gem Refractive Index and Birefringence

The following table summarizes the refractive index (RI) and birefringence (double refraction) values of common gemstones. These optical properties are essential for gemstone identification, as they provide reliable clues about a gem's structure and optical behavior.

If you need a tool to measure these properties, check out our [gem refractometer](#).

Not sure how to measure these values or what they mean? Read [this article](#) for a complete guide.

	Gemstone	Refractive Index	Birefringence
1	Hematite	2.940-3.220	0.287
2	Cinnabar	2.905-3.256	0.351
3	Proustite	2.881-3.084	0.203
4	Pyrargyrite	2.880-3.080	0.200
5	Cuprite	2.849	none
6	Rutile	2.616-2.903	0.287
7	Brookite	2.583-2.700	0.117
8	Anatase	2.488-2.564	0.046-0.067
9	Diamond	2.417-2.419	anomalous
10	Fabulite	2.409	none
11	Stibiotantalite	2.370-2.450	0.080
12	Sphalerite	2.368-2.371	none
13	Crocoite	2.290-2.660	0.270
14	Wulfenite	2.280-2.400	0.120
15	Tantalite	2.260-2.430	0.160
16	Linobate	2.210-2.300	0.090
17	Manganotantalite	2.190-2.340	0.150
18	Cubic Zirconia	2.150-2.180	none
19	Mimetite	2.120-2.135	0.015
20	Phosgenite	2.114-2.145	0.028
21	Senarmontite	2.087	none
22	Boleite	2.030-2.050	0.020
23	Zincite	2.013-2.029	0.016
24	Cassiterite	1.997-2.098	0.096-0.098
25	Simpsonite	1.994-2.040	0.058
26	Gadolinium Gallium Garnet	1.970-2.020	0.058

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27	Sulfur	1.958-2.245	0.291
28	Bayldonite	1.950-1.990	0.04
29	Scheelite	1.918-1.937	0.010-0.018
30	Andradite Garnet	1.880-1.940	none
31	Anglesite	1.878-1.895	0.017
32	Uvarovite Garnet	1.865	none
33	Purpurite	1.850-1.920	0.007
34	Sphene (Titanite)	1.843-2.110	0.100-0.192
35	Yttrium Aluminum Garnet	1.833-1.835	none
36	Zircon	1.810-2.024	0.002-0.059
37	Cerussite	1.804-2.079	0.274
38	Gahnite	1.791-1.818	none
39	Spessartite Garnet	1.790-1.820	none
40	Painite	1.787-1.816	0.029
41	Monazite	1.774-1.849	0.049-0.055
42	Almandine Garnet	1.770-1.820	none
43	Gadolinite	1.770-1.820	0.01-0.04
44	Ruby (Corundum)	1.762-1.778	0.008
45	Sapphire (Corundum)	1.762-1.778	0.008
46	Benitoite	1.757-1.804	0.047
47	Shattuckite	1.752-1.815	0.063
48	Chrysoberyl	1.746-1.763	0.007-0.011
49	Periclase	1.740	none
50	Scorodite	1.738-1.816	0.027-0.030
51	Staurolite	1.736-1.762	0.010-0.015
52	Grossular Garnet	1.734-1.759	none
53	Chambersite	1.732-1.744	0.012
54	Hessonite Garnet	1.730-1.757	none
55	Epidote	1.729-1.768	0.015-0.049
56	Pyroxmangite	1.726-1.764	0.016-0.020
57	Azurite	1.720-1.848	0.108-0.110
58	Pyrope Garnet	1.720-1.756	none
59	Hodgkinsonite	1.719-1.748	0.022-0.026
60	Taaffeite	1.719-1.730	0.004-0.009
61	Rhodonite	1.716-1.752	0.010-0.014

	Gemstone	Refractive Index	Birefringence
62	Gahnospinel	1.715-1.754	none
63	Spinel	1.712-1.762	none
64	Kyanite	1.710-1.734	0.015-0.033
65	Adamite	1.708-1.760	0.048-0.050
66	Diaspore	1.702-1.750	0.048
67	Serendibite	1.701-1.743	0.005
68	Sapphirine	1.701-1.734	0.004-0.007
69	Aegirine-Augite	1.700-1.800	0.030-0.050
70	Idocrase (Vesuvianite)	1.700-1.723	0.002-0.012
71	Tanzanite	1.691-1.700	0.009
72	Neptunite	1.690-1.736	0.029-0.045
73	Willemite	1.690-1.723	0.028-0.033
74	Rhodizite	1.690	none
75	Triphylite	1.689-1.702	0.006-0.008
76	Lithiophilite	1.680-1.700	0.01
77	Dumortierite	1.678-1.689	0.015-0.037
78	Legrandite	1.675-1.740	0.060
79	Hypersthene	1.673-1.731	0.010-0.016
80	Parisite	1.671-1.772	0.081-0.101
81	Clinozoisite	1.670-1.734	0.010
82	Sinhalite	1.665-1.712	0.036-0.042
83	Lawsonite	1.665-1.686	0.019-0.021
84	Diopside	1.664-1.730	0.024-0.031
85	Bustamite	1.662-1.707	0.014-0.015
86	Kornerupine	1.660-1.699	0.012-0.017
87	Hiddenite	1.660-1.681	0.014-0.016
88	Kunzite	1.660-1.681	0.014-0.016
89	Boracite	1.658-1.673	0.010-0.011
90	Axinite	1.656-1.704	0.010-0.012
91	Malachite	1.655-1.909	0.254
92	Sillimanite	1.655-1.684	0.014-0.021
93	Jadeite	1.652-1.688	0.20
94	Peridot	1.650-1.703	0.036-0.038
95	Ludlamite	1.650-1.697	0.038-0.044
96	Enstatite	1.650-1.680	0.009-0.012

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97	Euclase	1.650-1.677	0.019-0.025
98	Phenakite	1.650-1.670	0.016
99	Diopase	1.644-1.709	0.051-0.053
100	Jet	1.640-1.680	none
101	Eosphorite	1.638-1.671	0.028-0.035
102	Spurrite	1.637-1.681	0.039-0.040
103	Jeremejevite	1.637-1.653	0.007-0.013
104	Barite	1.636-1.648	0.012
105	Siderite	1.633-1.875	0.242
106	Danburite	1.630-1.636	0.006-0.008
107	Clinohumite	1.629-1.674	0.028-0.041
108	Apatite	1.628-1.649	0.002-0.006
109	Andalusite	1.627-1.649	0.007-0.013
110	Friedelite	1.625-1.664	0.030
111	Smithsonite	1.621-1.849	0.228
112	Datolite	1.621-1.675	0.040-0.050
113	Celestite	1.619-1.635	0.010-0.012
114	Tourmaline	1.614-1.666	0.014-0.032
115	Actinolite	1.614-1.653	0.020-0.025
116	Hemimorphite	1.614-1.636	0.022
117	Lazulite	1.612-1.646	0.031-0.036
118	Prehnite	1.611-1.669	0.021-0.039
119	Gaspéite	1.610-1.810	0.22
120	Turquoise	1.610-1.650	0.040
121	Topaz	1.609-1.643	0.008-0.016
122	Sugilite	1.607-1.611	0.001-0.004
123	Sogdianite	1.606-1.608	0.002
124	Brazilianite	1.602-1.623	0.019-0.021
125	Rhodochrosite	1.600-1.820	0.208-0.220
126	Odontolite	1.600-1.640	0.010
127	Nephrite	1.600-1.627	0.027
128	Pectolite (Larimar)	1.595-1.645	0.038
129	Montebrasite	1.594-1.633	0.22
130	Phosphophyllite	1.594-1.621	0.021-0.033
131	Meliphanite	1.593-1.612	0.019

	Gemstone	Refractive Index	Birefringence
132	Eudialyte	1.591-1.633	0.003-0.010
133	Chondrodite	1.592-1.646	0.028-0.034
134	Catapleiite	1.590-1.629	0.039
135	Wardite	1.590-1.599	0.009
136	Herderite	1.587-1.627	0.023-0.032
137	Colemanite	1.586-1.615	0.028-0.030
138	Howlite	1.586-1.605	0.019
139	Zektzerite	1.582-1.585	0.003
140	Amblygonite	1.578-1.646	0.024-0.030
141	Ekanite	1.572-1.573	0.001
142	Anhydrite	1.570-1.614	0.044
143	Augelite	1.570-1.590	0.014-0.020
144	Emerald (Beryl)	1.565-1.602	0.006
145	Aquamarine (Beryl)	1.564-1.596	0.004-0.005
146	Variscite	1.563-1.594	0.031
147	Beryl (Precious)	1.562-1.602	0.004-0.010
148	Tremolite	1.560-1.643	0.017-0.027
149	Vivianite	1.560-1.640	0.050-0.075
150	Serpentine	1.560-1.571	0.008-0.014
151	Larbradorite	1.559-1.570	0.008-0.010
152	Hambergite	1.553-1.628	0.072
153	Pyrophyllite	1.552-1.600	0.048
154	Muscovite	1.552-1.618	0.036-0.043
155	Beryllonite	1.552-1.561	0.009
156	Charoite	1.550-1.561	0.004-0.009
157	Amethyst (Quartz)	1.544-1.553	0.009
158	Aventurine (Quartz)	1.544-1.553	0.009
159	Rose Quartz	1.544-1.553	0.009
160	Citrine (Quartz)	1.544-1.553	0.009
161	Prasiolite (Quartz)	1.544-1.553	0.009
162	Smoky Quartz	1.544-1.553	0.009
163	Rock Crystal (Quartz)	1.544-1.553	0.009
164	Andesine	1.543-1.551	0.008
165	Oligoclase	1.542-1.549	0.007
166	Talc	1.540-1.590	0.050

	Gemstone	Refractive Index	Birefringence
167	Scapolite	1.540-1.579	0.006-0.037
168	Petrified Wood	1.540	none
169	Jasper	1.540	none
170	Amber	1.539-1.545	none
171	Ivory	1.535-1.570	none
172	Apophyllite	1.535-1.537	0.002
173	Tiger's Eye	1.534-1.540	none
174	Aragonite	1.530-1.685	0.155
175	Agate	1.530-1.540	0.004-0.009
176	Chalcedony	1.530-1.540	0.004-0.009
177	Chrysoprase	1.530-1.540	0.004-0.009
178	Moss Agate	1.530-1.540	0.004-0.009
179	Sepiolite	1.530	none
180	Witherite	1.529-1.677	0.148
181	Milarite	1.529-1.551	0.003
182	Nepheline	1.526-1.546	0.0004
183	Sunstone	1.525-1.548	0.010
184	Cordierite	1.522-1.578	0.008-0.018
185	Iolite (Cordierite)	1.522-1.578	0.008-0.018
186	Amazonite	1.522-1.530	0.008
187	Pearl	1.520-1.690	0.156
188	Ammolite	1.520-1.680	0.155
189	Strontianite	1.520-1.670	0.150
190	Gypsum	1.520-1.529	0.009
191	Orthoclase	1.518-1.530	0.008
192	Sanidine	1.518-1.530	0.008
193	Moonstone	1.518-1.526	0.008
194	Pollucite	1.517-1.525	none
195	Carletonite	1.517-1.521	0.004
196	Stichtite	1.516-1.544	0.026
197	Thomsonite	1.515-1.542	0.006-0.025
198	Magnesite	1.509-1.717	0.022
199	Scolecite	1.509-1.525	0.007-0.012
200	Leucite	1.504-1.509	0.001
201	Mesolite	1.504-1.508	0.001

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202	Dolomite	1.502-1.698	0.185
203	Petalite	1.502-1.519	0.012-0.017
204	Lapis Lazuli	1.500	none
205	Häüyne	1.496-1.510	none
206	Tugtupite	1.496-1.502	0.006
207	Cancrinite	1.495-1.528	0.024-0.029
208	Celluloid	1.495-1.520	none
209	Ulexite	1.491-1.520	0.029
210	Yugawaralite	1.490-1.509	0.011-0.014
211	Whewellite	1.489-1.651	0.159-0.163
212	Kurnakovite	1.488-1.525	0.036
213	Inderite	1.486-1.507	0.017-0.020
214	Calcite	1.486-1.658	0.172
215	Coral	1.486-1.658	0.160-0.172
216	Moldavite	1.48-1.540	none
217	Natrolite	1.480-1.493	0.013
218	Sodalite	1.480	none
219	Analcime	1.479-1.489	none
220	Thaumasite	1.464-1.507	0.036
221	Creedite	1.461-1.485	0.024
222	Chrysocolla	1.460-1.570	0.023-0.040
223	Obsidian	1.450-1.550	none
224	Gaylussite	1.443-1.523	0.080
225	Glass	1.440-1.900	none
226	Fluorite	1.434	none
227	Sellaite	1.378-1.390	0.012
228	Opal	1.370-1.520	none
229	Villiaumite	1.327	anomalous