

Index

- Abbe refractometer, 65
- Aberration, 38
 - balancing of, 40
 - chromatic, 39
 - monochromatic, 39
 - spherical, 39
- Abnormal blue, 108
- Abnormal colors, 108, 165
- Abnormal interference colors, 108, 165
- Absorption, biaxial crystals, 165
 - in tourmaline, 108
 - uniaxial crystals, 108
- Absorption formula, biaxial crystals, 166
 - uniaxial crystals, 108
- Accessories, optical, 128
 - Berek compensator, 132
 - Bertrand ocular, 131
 - biquartz wedge, 131
 - for measurement of extinction angles, 131
 - for measurement of path difference, 132
 - gypsum plate, 129
 - mica plate, 130
 - quartz wedge, 128
 - Universal Stage, 133
- Achromatic objectives, 46
- Acute bisectrix, 145
- Acute bisectrix figure, 184
 - off-center, 194
 - use in sign determination, 190
- Ahrens' prism, 89
- Air, index of refraction, 34
- Amici-Bertrand lens, 41
- Amorphous substances, 1
- Amplitude of wave, 23
- Analyzer, 46
- Analyzing prism, 46
- Angle, of extinction, 109, 131
 - of incidence, 30
 - of reflection, 30
 - of refraction, 33
- Angular aperture, 44
- Anhedral crystals, definition, 1
- Anisotropic substances, 22
 - measurement of optical properties, 224
- Anomalous interference figures, 211
- Aperture, angular, 44
 - numerical, 44
- Apochromatic objectives, 44
- Apparent optic angle, 185
- Apparent relief, 48
- Astigmatism, 39, 40
- Axes, crystal, 1, 2
- Axial ratio, 3
- Axinite, optic orientation, 160
- Axis of symmetry, 5
- Balancing of aberrations, 40
- Beam balance, 16
- Beam of light, 20
- Becke line, 48, 51
- Berek compensator, 132
- Berman, H., 56, 68
- Bertin's surface, biaxial crystals, 177
 - uniaxial crystals, 127
- Bertrand-Amici lens, 41, 112
- Bertrand ocular, 131
- Biaxial crystals, 143
 - absorption in, 165
 - determination of optic orientation, 164
 - dispersion in, 208
 - Huygenian constructions, 164
 - in convergent polarized light, 174
 - on Universal Stage, 232
 - optic orientation, 156, 157, 158
 - optical examination, 224
 - pleochroism, 165
 - refractive index measurement, 164
 - sign determination, 190
- Biaxial indicatrix, 143
 - equation, 170
 - related light surfaces, 170
- Biot-Fresnel law, 191

- Biquartz wedge, 131
 Birefringence, 93, 102, 146
 measurement of, 103
 Birefringence chart, 104
 Bisectrices, dispersion of, 209
 Bisectrix, acute, 145
 obtuse, 145
 Brewster's law, 87
 Brookite, dispersion in, 211
- Calcite, calculation of extraordinary index, 111
 in polarizing prisms, 88
 optical orientation, 76
 passage of light through, 81
- Calcite experiment, 81
- Cassinian curves, 176
- Cauchy's equation, 59
- Center of symmetry, 5
- Central illumination, 50
- Chaulnes' method of index measurement, 66
- Chromatic aberration, 38, 39
- Circular sections, 145
- Circularly polarized light, 28
- Cleavage, 14
- Cleavage fragments, use in sign determination, 135
- Color, 16
 by interference, 93, 165
 in quartz wedge, 101
- Color fringes, in oblique illumination, 55
 on isogyres, 209
- Color spectrum, 34
- Coma, 39
- Combination, crystallographic, 5
 of wave motion, 25
- Compensating eyepieces, 46
- Compensation, by quartz wedge, 105
 mechanism of, 105
- Compensator, Berek, 132
 quartz, 132
- Composition of waves, 27
- Composition plane, 8
- Compound lenses, 40
- Condensing lens, 40
- Conical refraction, exterior, 166
 interior, 166
- Conjugate radii, 72, 147
- Conoscope, 41
 optical system, 113
- Constructive interference, 25
- Convergent light, 174
- Converging lenses, 37
- Critical angle, 35, 63
- Crossed axial plane dispersion, 211
- Crossed dispersion, 212, 213
- Crystal, definition, 1
 nature of, 1
- Crystal axes, 1, 2
- Crystal combination, 5
- Crystal form, 5
- Crystal habit, 5
- Crystal parameters, 3
- Crystal systems, 1
- Crystalline substances, 1
- Crystallographic form, 5
- Crystals, length fast, 142
 length slow, 142
 nature of, 1
 used in sign determination, 135
- Defects of lenses, 38
- Depth of focus, 44
- Destructive interference, 26
- Dextro-rotatory crystals, 92
- Dichroism, 108
- Differential absorption, 108
- Diffuse reflection, 31
- Dispersion, 58
 amounts of, 208
 crossed, 212, 213
 crossed axial plane, 211
 horizontal, 213, 215
 in biaxial crystals, 208
 in monoclinic crystals, 212
 in orthorhombic crystals, 209
 in triclinic crystals, 219
 inclined, 213, 217
 of refractive indices, 58, 208
 of the bisectrices, 219
 of the optic axes, 208
 orthorhombic, 209
 partial, 58
 relative, 58
 rhombic, 209
 total, 58
 triclinic, 219
- Dispersion curves, 59

- Dispersion formula, 208
 Dispersion methods of index measurement, 60
 Distortion by lenses, 39, 40
 Diverging lenses, 37
 Double refraction, in calcite, 81
 of light in conoscope, 113
 Double variation method, 60
 Due de Chaulnes, 66
- E* rays, 71
E waves, 70
 Electromagnetic spectrum, 19
 Electromagnetic theory of light, 18
 Elements of symmetry, 5
 Ellipse, spherical, 179
 Ellipsoid, Fresnel, 171
 triaxial, 143
 uniaxial, 69
 Elliptically polarized light, 28
 Elongation, negative, 142
 positive, 142
 sign of, 141
 Emmons, R. C., 61
 Equal area net, 230
 Equipment for optical examination, 220
 Euhedral crystals, 1
 Exterior conical refraction, 166
 Extinction angles, 109
 measurement of, 131
 Extinction positions, 93
 Extraordinary rays, 71
 Extraordinary waves, 70
 Eyepieces, 46
 compensating, 46
 Huygenian, 46
 hyperplane, 46
- Fast component, 128
 Fast rays, 128
 Fast waves, 128
 Federow net, 230
 First-order red plate, 129
 First-order spectrum, 101
 Five-axis stage, 227
 Fivelng, 8
 Flash figures, origin, 123, 189
 use in sign determination, 141
 Fluorite objectives, 46
- Focal distance, 38
 Focal length, 38
 Focal point, 37
 Focus, 37
 depth of, 44
 real, 38
 virtual, 38
 Form, crystallographic, 5
 Four-axis stage, 227
 Fourling, 8
 Fracture, 14
 Fraunhofer lines, 58
 Frequency of waves, 19, 25
 Fresnel ellipsoid, biaxial, 171
 uniaxial, 86
 Fusibility, 16
 Fusibility scale, 17
- Gladstone and Dale, law of, 67
 Gnomonic projection, 12
 Gypsum plate, 129, 136, 139
- Habit, 5
 Hardness, 15
 scale of, 15
 Hartmann equations, 59
 Hexagonal system, definition, 1
 Higher-order spectra, 102
 Higher-order white, 102
 Horizontal dispersion, 213, 215
 Huygenian constructions, for uniaxial crystals, 76
 in biaxial crystals, 164
 Huygenian eyepiece, 46
 Huygens' principle, 30
 Hyperplane eyepiece, 46
- Iceland spar, 89
 Illumination, central, 50
 oblique, 51
 Image, real, 38
 reversal of, 38
 virtual, 38
 Immersion media, 56
 examination of fragments in, 222
 table of, 57
 Immersion mounts, 223
 Incidence, angle of, 30
 plane of, 30
 Inclined dispersion, 213, 217

- Index determination, in biaxial crystals, 164
 in uniaxial crystals, 109
- Index measurement using interference figures, 205
- Index of extraordinary wave, 70
- Index of ordinary wave, 70
- Index of refraction, 33
 as related to specific gravity and composition, 67
 by Becke line method, 48
 by central illumination, 50
 by Chaulnes' method, 66
 by dispersion methods, 60
 by measurement of critical angle, 63
 by minimum deviation, 61
 by oblique illumination, 51
 by perpendicular incidence, 62
 calculation in calcite, 111
 definition, 33
 in biaxial crystals, 164
 in uniaxial crystals, 109
 measurement of, 47
 of air, 34
 various designations, 71, 143
 with hollow glass prism, 64
- Index surface, biaxial, 172
 uniaxial, 86
- Indicatrix, biaxial, 143, 170
 isotropic, 35
 surfaces related to, 82, 170
 uniaxial, 69, 82
- Indices, of crystal faces, 3
 of refraction, in sign determination, 134
 of biaxial crystals, 143
 of uniaxial crystals, 109
- Initial magnification, 42
- Interfacial angles, constancy of, 1
- Interference, constructive, 25
 destructive, 26
- Interference colors, 93, 165
 abnormal, 108
 order of, 103
- Interference figures, acute bisectrix, 184, 190
 anomalous, 211
 biaxial, 174
 biaxial optic axis, 187, 200
- Interference figures, biaxial, obtuse bisectrix, 187, 200
 off-center biaxial, 197
 off-center uniaxial, 121
 optic normal, 189
 uniaxial, 112
 uniaxial optic axis, 114, 137
 use in index measurement, 205
- Interference of waves, 25
- Interior conical refraction, 166
- Internal reflection, 36
- Isochromatic curves, 112, 174, 175
- Isogyres, biaxial crystals, 174, 178
 color fringes, 209
 from skiodrome, 119, 183
 uniaxial crystals, 112
- Isometric system, 1
- Isomorphism, 220
- Isotaques, 181
- Isotropic indicatrix, 35
- Isotropic substances, definition, 22
 optical examination, 223
- Jolly balance, 16
- Larsen, E. S., 56, 68
- Law of constancy of interfacial angles, 1
- Law of rational intercepts, 3
- Law of reflection, 30
- Length fast crystals, 142
- Length slow crystals, 142
- Lenses, 37
 Bertrand-Amici, 41
 biconcave, 38
 compound, 40
 converging, 37
 defects, 38
 diverging, 37
 simple, 37
- Levo-rotatory crystals, 92
- Lichtenecker equation, 67
- Light, electromagnetic theory, 18
 monochromatic, 20
 nature of, 18
 polarization of, 87
 quantum theory, 18
 reflection of, 30
 refraction of, 31
 velocity of, 18
 wave lengths, 19, 20, 101

- Light ray, definition, 20
 Light surfaces, related to biaxial indicatrix, 170
 related to uniaxial indicatrix, 82
 Light wave, definition, 20
 Lorentz equation, 67
 Lorenz equation, 67
 Luster, 16, 31
- Magnification, by objective lens, 42
 initial, 42
 Magnifying power of microscope, 46
 Malformed crystals, 1
 Mallard's constant, 186
 Measurement, of birefringence, 103
 of extinction angles, 131
 of optic angle, 185
 of path difference, 132
 of phasal difference, 132
 of refractive indices of uniaxial crystals, 109
 Melilite, 108
 Merwin, H. E., 60
 Mica plate, 130, 135, 139
 Microscope, eyepieces, 46
 objectives, 41
 oculars, 46
 petrographic, 41
 polarizing, 41
 Microscopic examination of nonopaque substances, 220
 Miller indices, 3
 Minimum deviation, method of, 61
 Mohs scale, 15
 Molecular refraction, 68
 Monochromatic aberrations, 39
 Monochromatic light, 20
 Monoclinic crystals, dispersion in, 212
 optic orientation, 157
 Monoclinic system, definition, 2
- Negative crystals, biaxial, 144
 uniaxial, 69
 Negative elongation, 142
 Negative uniaxial indicatrix, 69
 Net, stereographic, 230
 Nicol prism, construction of, 89
 Nonopaque substances, microscopic examination, 220
 Numerical aperture, 44
- O* rays, 70
O waves, 70
 Objectives, achromatic, 46
 apoachromatic, 44
 fluorite, 46
 microscope, 41
 Oblique illumination, 51
 color fringes, 55
 Obtuse bisectrix, definition, 145
 Obtuse bisectrix figure, origin, 187
 use in sign determination, 200
 Oculars, compensating, 46
 Huygenian, 46
 hyperplane, 46
 Off-center acute bisectrix figures, 194
 Off-center biaxial optic axis figures, 205
 Off-center uniaxial figures, use in sign determination, 140
 Off-center uniaxial optic axis figures, 121
 Oil-immersion objective, 44
 Optic angle, apparent, 185
 calculation of, 145, 146
 real, 185
 Optic axes, dispersion of, 208
 primary, 145, 152
 secondary, 152
 Optic axis, uniaxial, 69
 Optic axis figure, biaxial, 187
 off-center, 205
 use in sign determination, 200
 uniaxial, 114
 off-center, 121
 use in sign determination, 137
 vector analysis of, 118
 Optic normal, 145
 Optic normal interference figure, 189
 Optic orientation, by Universal Stage, 231, 232
 of biaxial crystals, 156, 157, 158, 164
 of monoclinic crystals, 157
 of orthorhombic crystals, 156
 of triclinic crystals, 158
 of uniaxial crystals, 76
 Optic plane, 145
 Optic sign, from acute bisectrix figures, 190
 from biaxial optic axis figure, 200
 from crystals or cleavage fragments, 135
 from flash figures, 141

- Optic sign, from obtuse bisectrix figure, 200
 from refractive indices, 134
 in biaxial crystals, 190
 in uniaxial crystals, 134
- Optical accessories, 128
- Optical activity, 90
- Optical data, tabulation, 224, 225
- Optical examination, of biaxial substances, 224
 of crystals, 222
 of fragments, 222
 of isotropic substances, 223
 of uniaxial substances, 224
- Optical orientation, of biaxial crystals, 156, 157, 158, 164
 of uniaxial crystals, 76
- Optical properties, determination, 222
 measurement of, 220
 tabulation, 224, 225
- Optical system of conoscope, 113
- Optically active crystals, 90
- Order of an interference color, 103
- Ordinary ray, 70
- Ordinary wave, 70
- Orthographic projection, 13
- Orthorhombic crystals, dispersion, 209
 optic orientation, 156
- Orthorhombic dispersion, 209
- Orthorhombic system, definition, 2
- Orthoscope, 41, 174
- Ovaloid, biaxial, 172
 uniaxial, 86
- Parameters, 3
 crystal, 3
- Partial dispersion, 58
- Parting, 14
- Passage of light through crystal plates, 94
- Path difference, measurement, 103, 132
- Peacock, M. A., 160
- Period of a wave, 23, 25
- Perpendicular incidence method of index measurement, 62
- Petrographic microscope, 41
 action on crystal plates, 93
 construction of, 41
- Phasal difference, measurement of, 103, 132
- Phase, 21
- Photon, 18
- Physical properties, 14
- Plane, of incidence, 31
 of symmetry, 5
 of vibration, 25, 128, 152, 179
- Plane-polarized light, 25
- Pleochroic formula, 108, 165
- Pleochroism, in biaxial crystals, 165
 in uniaxial crystals, 108
- Polarization, by absorption, 88
 by double refraction, 88
 by reflection, 87
 by scattering, 90
 of light, 87
 rotary, 90
- Polarizer, 46
- Polarizing microscope, 41
 action on crystal plates, 93
 construction of, 41
- Polarizing prisms, 46, 89
- Polaroid, 88
- Pole in projections, 9
- Polysynthetic twins, 8
- Positive crystals, biaxial, 144
 uniaxial, 69
- Positive elongation, 142
- Positive uniaxial indicatrix, 69
- Posnjak, E., 60
- Preparation of samples for optical study, 222
- Primary optic axes, 145, 152
- Principal section, 69
- Prisms, polarizing, 46, 89
- Projection, gnomonic, 12
 orthographic, 13
 spherical, 8
 stereographic, 11
- Pyramid, unit, 3
- Quanta, 18
- Quantum theory, 18
- Quarter undulation plate, 130
- Quartz, optical orientation, 76
 rotary polarization, 90
- Quartz compensator, 132
- Quartz crystals, 90
- Quartz wedge, 100, 128
 colors in, 101
 compensation by, 105

- Quartz wedge, in monochromatic light, 100
 in white light, 101
 uses, 128
- Radiation, 18
 scattered, 90
- Radii, conjugate, 72, 147
- Ratio, axial, 3
- Rational intercepts, law of, 3
- Ray, definition, 20
 extraordinary, 71
 fast, 128
 ordinary, 70
 slow, 128
- Ray surface, 21, 23
 biaxial crystals, 146
- Ray velocity surface, 21
 biaxial, 146
 equation, 170
 uniaxial, 73
 equation, 82
- Rays as related to wave normals, 152
- Real focus, 38
- Real image, 38
- Real optic angle, 185
- Red of first-order plate, 129
- Reflection, angle of, 30
 diffuse, 31
 of light, 30
 regular, 31
 total, 35
- Reflectometer, 63
- Refraction, index of, 33
 molecular, 68
 of light, 31
- Refractive indices, biaxial crystals, 143
 measurement, 164
 uniaxial crystals, 71
 measurement, 109
 used in sign determination, 134
 various designations, 71, 143
- Refractive index (*see also* Index of refraction), 33
 by Becke line method, 48
 by central illumination, 50
 by Chaulnes' method, 66
 by dispersion methods, 60
 by measurement of critical angle, 63
 by minimum deviation, 61
- Refractive index, by oblique illumination, 51
 by perpendicular incidence, 62
 calculation in calcite, 111
 of air, 34
- Refractive index dispersion, 56
- Refractive index measurement, 47
- Refractometer, Abbe, 64
- Refringence, 34
- Regular reflection, 31
- Relative dispersion, 58
- Relief, 47
 apparent, 48
- Repeated twins, 8
- Resolution of wave motion, 25
- Resolving power, 42
- Rhombic dispersion, 209
- Rotary polarization, 90
- Rotation of plane of polarization, 90
- Rotatory polarization, 90
- Scale, of fusibility, 17
 of hardness, 16
- Scattered radiation, 90
- Schmidt equal-area net, 230
- Second-order spectrum, 101
- Secondary optic axes, 152
- Section, principal, 69
- Sections, circular, 145
- Sensitive tint plate, 129
- Shagreen, 47
- Sign, from acute bisectrix figure, 190
 from biaxial interference figures, 190
 from biaxial optic axis figure, 200
 from crystals or cleavage fragments, 135
 from obtuse bisectrix figure, 200
 from uniaxial flash figure, 141
 from uniaxial interference figures, 134
 from uniaxial optic axis figure, 137
- Sign determination, biaxial crystals, 190
 uniaxial crystals, 134
- Sign of elongation, 141
- Simple harmonic oscillation, 23
- Sinusoidal wave motion, 23
- Skiodrome, biaxial crystals, 181
 uniaxial crystals, 119
- Slow component, 128
- Slow ray, 128
- Slow wave, 128

- Snell's law, 33
 Solid solutions, 220
 Specific gravity, 16
 Specific refractive energy, 67
 Spectrometer, 61
 Spectrum, electromagnetic, 19
 first-order, 101
 from transparent prism, 34
 higher-order, 102
 second-order, 101
 third-order, 102
 visible, 20
 Spherical aberration, 39
 Spherical ellipse, 179
 Spherical projection, 8
 Standard wave lengths, 58
 Stereographic net, 230
 Stereographic projection, 11
 Streak, 16
 Subhedral crystals, 1
 Surface, Bertin's, 126, 177
 ray velocity, 146
 Surfaces, related to biaxial indicatrix,
 170
 related to uniaxial indicatrix, 82
 Symmetry, center of, 5
 plane of, 5
 Symmetry axis, 5
 Symmetry elements, 5
 Symmetry plane, 5

 Tetragonal system, definition, 1
 Thickness, measurement of, 103
 Third-order spectrum, 102
 Total dispersion, 58
 Total internal reflection, 36
 Total reflection, 35, 63
 Tourmaline, differential absorption by,
 108
 Tourmaline tongs, 108
 Trace of plane of vibration, 128
 Triaxial ellipsoid, 143
 Triclinic crystals, optic orientation, 158
 optical properties, 225
 Triclinic dispersion, 219
 Triclinic system, definition, 3
 Trill, 8
 Twin axis, 7
 Twin plane, 8
 Twinned crystals, 7

 Twins, 7
 polysynthetic, 8
 repeated, 8
 simple, 8

 Uniaxial Bertin's surfaces, 127
 Uniaxial crystals, examination on Uni-
 versal Stage, 231
 flash figure, 123
 in convergent polarized light, 112
 in plane-polarized light, 93
 interference figures, 112
 interaction with microscope, 93
 measurement of refractive indices,
 109
 optic axis figure, 114
 optic orientation, 76
 optical examination, 224
 sign determination, 134
 tabulation of data, 224
 Uniaxial indicatrix, 69
 equation, 82
 Uniaxial optic axis figure, off-center, 121
 sign determination, 137
 vector analysis, 118
 Unit pyramid, 3
 Universal Stage, 133, 227
 construction of, 228
 designation of axes, 229
 measurement of biaxial crystals, 232
 measurement of uniaxial crystals, 231
 plotting of data, 230
 Universal Stage method, 227

 Vector analysis, uniaxial optic axis
 figure, 118
 Vector diagrams, uniaxial crystal plates,
 96, 98
 uniaxial interference figures, 117
 Vibration directions, Biot-Fresnel con-
 struction, 191
 by approximate method, 192
 from skiodrome, 119, 183
 Vibration plane, 25, 128, 179
 Virtual focus, 38
 Virtual image, 38
 Visible spectrum, 20

 Wave, extraordinary, 70
 fast, 128

- Wave, ordinary, 70
slow, 128
Wave front, 21
as related to parallel oblique rays, 83
Wave length, definition, 23
Wave lengths, of visible light, 19, 20,
101
standard, 58
Wave motion, composition and resolution, 25
sinusoidal, 23
Wave of light, definition, 20
Wave normal, 22, 23
as related to rays, 152
- Wave velocity surface, biaxial, equation, 171
uniaxial, 82
equation, 86
Waves, interference of, 25
Wedge, biquartz, 131
quartz, 100, 128
West, C. D., 57
Westphal balance, 16
White of a higher order, 102
Wright, F. E., 132
Wright's biquartz-wedge, 131
Wulff net, 230
- Zones, crystal, 9