

# Mineral Index

Nomenclature follows M. H. Hey (*Chemical Index of Minerals*, British Museum, Natural History; 1955, Appendix, 1963). For unnamed compounds see the appropriate chapters, and their supplementary bibliographies. Pages that give data are listed in italics, and those that carry spectra are in bold type.

- Acanthite *117*  
Actinolite 318, 321, 322, 326, 327  
Adamite (adamine) 399  
Adularia 367, **369**  
Aegirine 326  
Aeschynite 413  
Afwillite 158, *165*, *168*, 452  
Akaganeite 172  
Åkermanite 101, 299  
Aksaite 220  
Alamosite 326  
Albite 90, 96, **98**, 367, **369**, 370  
Alite 298, **447**  
Allactite 399  
Allanite 299, 376, **377**, 378  
Allophane 358  
Alluaudite 420  
Almandine **291**, 297, 298  
Alstonite 258  
Alum 433, **437**, 439  
Aluminite 431  
Alumohydrocalcite 271  
Alunite 433, 439  
Alunogen 430, 439  
Amarantite 430  
Amblygonite 407, 420  
Amesite **342**, *343*, **347**, *348*  
Ammonioborite 221, 223  
Amosite 327  
Analcime 164, *165*, 368, 371, **372**, 373  
Anatase 60, **194**, 196  
Andalusite **292**, 298  
Andersonite 273  
Andradite **291**, 297, 298  
Anglesite 133, 427, 439  
Anhydrite 130, 133, 427, **437**, 439  
Ankerite 253  
Annabergite 133, 399  
Annite 336, 345, **346**  
Anorthite 96, 367, **369**  
(hexagonal) 370  
Anthophyllite 312, 320, 322, 326, 327  
Antigorite **342**, *343*, **347**, *348*  
Antlerite 430, 439  
Apatite **132**, 133, 274, 388, 390, **391**, 414, 419  
Aphthitalite 431, 439  
Aplome (polyadelphite) 298  
Apophyllite 164, *165*, 352, 359  
Aragonite 129, 133, **240**, 242, **243**, *245*, *246*, 273, 277  
Arcanite 425, 439  
Ardealite 419, 439  
Ardennite 299  
Arfvedsonite 323, 327  
Argentojarosite 433, **437**  
Arrojadite 420  
Arsenolite 197  
Artinite 264, **265**, **266**  
Ascharite: see szajbelyite  
Astrolite 358  
Atelestite 403  
Augelite 404  
Aurichalcite 268  
Autunite 408  
Axinite **374**, 376  
Azurite 268  
Babingtonite 326  
Baddeleyite 197  
Bandyllite 216, 217  
Baotite 326  
Barrandite 400  
Barysilite 299  
Baryte 133, 427, **437**, 439  
Barytocalcite 258  
Bassanite 427, **437**, 439  
Bastnäsité 272  
Batisite 326  
Bavenite 377, 378  
Bayerite 145, *147*  
Bayldonite 405  
Behoite 145, **148**, 172, 379, 467, 468, 469  
Beidellite **335**, 338, **349**, 350, 357, 358  
Benitoite 326  
Benstonite 258  
Beraunite 404  
Berlinite 400, 419  
Bertrandite 377, **378**, 379  
Beryl 308, *309*, 326, **377**  
Beryllonite 377, 378, *407*  
Berzeliite 408  
Beudantite 433

- Bieberite 429, 439  
 Biotite 334, 335, 336, 337, 345, 346, 355, 356,  
 357, 358  
 Birnessite 197  
 Bismutite 117  
 Bismutoferrite 298  
 Bixbyite 196  
 Blende (sphalerite) 90, 117, 133, 134  
 Blödite 432, 439  
 Boehmite 145, 147, 148, 150, 172, 356  
 $\alpha$ -Boracite 221  
 Borax 221  
 Borcarite 218  
 Botryogen 435, 439  
 Boulangerite 117  
 Boussingaultite 439  
 Brackebuschite 392  
 Braunite 298  
 Brewsterite 374  
 Britholite 298  
 Brochantite 430, 439  
 Bromargyrite 116  
 Bromellite 196  
 Bronzite 327  
 Brookite 194, 196  
 Brownmillerite 196  
 Brucite 138, 142, 143, 470, 473, 475  
 Brunsvigite 342  
 Brushite 392, 393, 395, 419  
 Bunsenite 184, 185, 197  
 Burkeite 273, 439  
 Bustamite 326  
 Bütschliite 256, 257  
 Byströmite 412
- Cabrerite 399  
 Calciochondrodite 298, 452, 453  
 Calcite 90, 129, 133, 229, 232, 233, 234, 235,  
 237, 238, 239, 240, 254, 273, 277  
 Calcite II 246, 248  
 Calcite III 246, 248  
 Caledonite 434  
 Calomel 116  
 Cancrinite 367, 371, 372  
 Carletonite 359  
 Carminite 133  
 Carnotite 408  
 Carpholite 326  
 Carphosiderite 430  
 Caryinite 399  
 Cassiterite 183, 186, 196, 197  
 Catapleiite 326  
 Celadonite 335, 338, 339, 349, 350, 351, 356,  
 357, 358, 434  
 Celestine 133, 427, 439  
 Celsian (hexagonal) 370  
 Cerargyrite 116  
 Cerianite 197  
 Cerite 299  
 Cerolite 358  
 Cerussite 240, 242, 245  
 Chabazite 373  
 Chalcantite 429, 439  
 Chalcocyanite 428, 439  
 Chalcomenite 426  
 Chalcophyllite 434, 439  
 Chalcopyrite 90  
 Chevkinite 299  
 Chinglusuite 359  
 Chiolite 116  
 Chkalovite 377  
 Chlorargyrite 116  
 Chlorite 342, 343, 347, 348, 355, 358  
 Chloritoid 359  
 Chondrodite 290, 298  
 Chromatite 440  
 Chromite 195, 196  
 Chrysoberyl 196  
 Chrysocolla 359  
 Chrysoprase earth 358  
 Chrysotile 342, 343, 347, 348, 478, 479, 480  
 Churchite (weinschenkite) 401, 403  
 Cinnabar 117  
 Claudetite 197  
 Clinoenstatite 326  
 Clinoptilolite 373  
 Clinozoisite 299  
 Clintonite 336, 351, 357, 358  
 Coalingite 271  
 Cobaltocalcite 239, 340  
 Coesite 369, 486  
 Colemanite 213, 219, 221  
 Collinsite 392  
 Columbite (niobite) 413  
 Cookeite 358  
 Copiapite 435, 439  
 Coquimbite 430, 439  
 Cordierite 90, 99, 100, 308, 309, 310, 326,  
 466  
 Cornetite 387  
 Coronadite 197  
 Corundum 90, 93, 186, 188, 189, 190, 196  
 Corvusite 172  
 Cotunnite 116  
 Coulsonite 196  
 Crandallite 402, 404  
 Cristobalite 368, 369  
 Crocidolite 307, 314, 317, 322, 324, 326, 327  
 Crocoite 426, 440  
 Cronstedtite 358  
 Crossite 323  
 Cryolite 116  
 Cummingtonite 318, 320, 322, 326, 327  
 Cuprite 197  
 Cuspidine 299

- Dahllite 274  
 Danalite 377, 378  
 Danburite 374, 375, 376  
 Daphnite 342  
 Datolite 218, 375, 376  
 Davyne 371, 372  
 Dawsonite 270, 271  
 Dellaite 452  
 Descloizite 133, 392, 419  
 Deweylite 348, 358  
 Diamond 133, 134  
 Diaspore 145, 147, 148, 150, 151, 172  
 Diatomite 369  
 Dickite 335, 340, 358  
 Dietrichite 434, 435  
 Dimorphite 117  
 Diopside 298, 326  
 Dioptase 326  
 Dolerophane 430, 439  
 Dolomite 90, 91, 129, 133, 236, 253, 254, 277  
 Dravite 376  
 Dufrenite 404  
 Dufrenoyite 117  
 Dumortierite 374, 375, 376  
 Dypingite 264  
 Dzhallindite 145  
  
 Eastonite 335, 345, 346  
 Eitelite 256, 257, 277  
 Eleonorite (beraunite) 404  
 Ellestadite 298  
 Elpidite 327  
 Enstatite 90, 327, 480  
 Ephesite 336, 351, 357  
 Epididymite 164, 165, 376, 377, 379  
 Epidote 298, 299  
 Epsomite 429, 439  
 $\alpha$ -Ericaite 221  
 Erythrite (erythrin) 399  
 Eskolaite 189, 190, 196  
 Ettringite 434, 438, 439, 459, 460  
 Euchroite 399  
 Euclase 378, 379  
 Eucolite 326  
 $\alpha$ -Eucryptite 367  
 $\beta$ -Eucryptite 371  
 Eudialyte 326  
 Eudidymite 376, 379  
 Eulytine 298  
 Euxenite 413  
 Ewaldite 258  
 Ezcurrite 221  
  
 Fabianite 221  
 Fairchildite 256  
 Fassaite 327  
 Faujasite 164, 373, 374  
 Fauserite 439  
  
 Fayalite 288, 289, 298  
 Feldspars 96, 298, 367  
 Ferberite 133, 435, 440  
 Fergusonite 130  
 Ferrinatriite 434, 439  
 Ferriphlogopite 346  
 Ferrucite 116  
 Fersmite 413  
 Fibroferrite 430, 439  
 Fichtelite 118  
 Fireclays 335, 341, 358  
 Fluoborite 212  
 Fluorapatite 132, 390  
 Fluorite 116  
 Fluorphlogopite 337, 346  
 Forsterite 289, 290, 298, 480  
 Foshagite 453, 454  
 Fowlerite 327  
 Francolite 274  
 Franklinitite 192, 197  
 Friedelite 359  
  
 Gadolinite 376, 378  
 Gahnite 192, 196  
 Galaxite 196  
 Galena 117  
 Ganomalite 299  
 Garnets 133, 298, 459  
 Garnierite 358  
 Gaspeite 239  
 Gaylussite 270  
 Gearsutite 172  
 Gedrite 318, 320, 327  
 Gehlenite 101, 299  
 Geikielite 90, 93  
 Genthite 348, 358  
 Gibbsite 145, 149, 150, 151, 355  
 Gillespite 359  
 Ginorite 221, 222  
 Gismondine 373  
 Glaserite see apthitalite  
 Glauberite 432, 433, 439  
 Glaucochroite 298  
 Glauconite 339, 358  
 Glaucochroite 314, 323, 324, 325, 326, 327  
 Gmelinite 374  
 Goethite 147, 172, 354, 355  
 Goslarite 429, 439  
 Gowerite 220, 222  
 Graftonite 392, 419  
 Grandidierite 375, 376  
 Graphite 133  
 Gratonite 117  
 Greenalite 358  
 Greenockite 117  
 Grimaldiite 154, 155  
 Grossular 280, 291, 297, 298  
 Grouitite 145

- Grunerite 318, 320, 326  
 Gunningite 429, 439  
 Gypsum 130, 133, 165, 166, 403, 427, 437, 439  
 Gyrolite 456
- Hagendorfite 408  
 Halite 116  
 Halloysite 341, 353, 355, 358  
 Halotrichite 434, 435  
 Halurgite 222  
 Hambergite 133, 214  
 Hanksite 273, 431  
 Hardystonite 296, 299  
 Harkerite 222, 224  
 Harmotome 373, 374  
 Hastingsite 314  
 Hausmannite 196  
 Häuyne 372  
 Hectorite 334, 335, 337, 345, 352  
 Hedenbergite 327  
 Heidornite 222  
 Hellandite 298  
 Helvine 377, 378  
 Hematite 189, 190, 194, 197  
 Hemimorphite 296, 298  
 Hercynite 196  
 Herderite 378, 392  
 Hetaerolite 197  
 Heterogenite 154, 155  
 Heteromorphite 117  
 Heterosite 400  
 Heulandite 373, 374  
 Hiddenite 327  
 Hieratite 116  
 Hilgardite 223  
 Hillebrandite 453, 454  
 Hisingerite 359  
 Hohmannite 430  
 Hollandite 197  
 Holmquistite 322, 325  
 Homilite 376  
 Hornblende 318, 321, 322, 327  
 Howlite 375  
 Hsianghualite 377, 379  
 Hübnerite 435, 440  
 Humboldtine 118  
 Humite 290, 298  
 Hummerite 409  
 Huntite 253, 255, 278  
 Hurlbutite 378, 392  
 Huttonite 298  
 Hyalophane 369  
 Hydrobiotite 355  
 Hydroboracite 222  
 Hydrocerussite 268  
 Hydrocyanite 428, 439  
 Hydrogarnet 459  
 Hydromagnesite 264, 265, 266
- Hydroniccite 138  
 Hydrotalcite 271  
 Hydroxycancrinite 367  
 Hydroxysodalite 372  
 Hydrozincite 268  
 Hypersthene 327
- Ice 104, 162  
 Idocrase (vesuvianite) 299  
 Ikaite 264  
 Ilesite 439  
 Ilmenite 91, 194, 197  
 Ilmenorutile 413  
 Ilvaite 296, 299  
 Imogolite 358  
 Inderborite 222  
 Inderite 219, 222  
 Indialite 99  
 Inesite 327  
 Inyoite 219, 223  
 Iodargyrite 116  
 Ivaarite 291, 298
- Jacobsite 197  
 Jadeite 327  
 Jarosite 433, 439  
 Jennite 453  
 Joaquinite 299  
 Johannite 434, 439  
 Johannsenite 327  
 Jordanite 117
- Kainite 439  
 Kaliborite 223  
 Kalicinite 152, 260, 261  
 Kalinite 439  
 Kalkibeborosilite 376  
 Kaolinite 335, 338, 340, 341, 349, 350, 353, 355, 356, 358, 467, 468, 469, 476, 477  
 Karelianite 196  
 Kentrolite 298  
 Kernite 223  
 Kerstenite 427, 440  
 Kieserite 429, 439  
 Kilchoanite 299, 452, 453  
 Knebelite 298  
 Koenenite 172  
 Kornerupine 374, 375, 376  
 Kotoite 206, 212  
 Köttigite 399  
 Kribergite 402  
 Kröhnkite 432, 433, 439  
 Kunzite 327  
 Kurchatovite 216  
 Kurnakovite 222, 223  
 Kutnahorite 253  
 Kyanite 292, 298

- Labuntsovite 299  
 Langbeinite 431, 432, 439  
 Langite 430, 439  
 Lansfordite 264  
 Larderellite 221, 223  
 Larnite 298, 447  
 Laumontite 367, 373, 374  
 Låvenite 299  
 Lawsonite 299  
 Lazulite 404, 420  
 Lazurite 372  
 Leadhillite 273, 427, 439  
 Lechatelierite 487  
 Leonhardtite 439  
 Leonite 432, 439  
 Lepidocrocite 145, 147, 151, 172, 355  
 Lepidolite 349, 350, 358  
 Leucite 371, 372  
 Leucophane 377, 379  
 Leucophosphite 405, 414, 419  
 Leucosphenite 376  
 Libethenite 397  
 Lime 196  
 Linarite 434, 439  
 Liroconite 405  
 Litharge 197  
 Lithiophilite 407, 420  
 Lithiophosphate 385, 419  
 Lomonosovite 299  
 Lopezite 436  
 Löweite 432  
 Ludlamite 397  
 Ludwigite 212, 213  
 Lüneburgite 223
- Magnesioferrite 197  
 Magnesite 233, 234, 236, 238, 239, 240, 277  
 Magnetite 194, 195, 197  
 Malachite 268  
 Malladrite 116  
 Manganite 154, 155  
 Manganosite 184, 196  
 Marcasite 117  
 Margarite 335, 338, 351, 353, 357, 358, 378  
 Marialite 372  
 Mascagnite 425, 439  
 Massicot 197  
 Mausite 439  
 Mayenite 196  
 Meionite 372  
 Melaconite 197  
 Melanite 291  
 Melanocerite 376  
 Melanotekite 298  
 Melanterite 429, 439  
 Melilite 299  
 Meliphane 376, 378  
 Mellite 118
- Mercurite 426  
 Merwinite 298  
 Metahalloysite 341, 358  
 Metahewettite 409  
 Metakaolinite 356, 357, 476, 477  
 Metavariscite (clinovariscite) 402, 414, 419  
 Metavoltine 434  
 Metazeunerite 408  
 Meyerhofferite 219, 220, 221, 223  
 Microcline 96, 367, 369, 370  
 Milarite 326, 377  
 Mimetite 390, 391  
 Minium 197  
 Minnesotaite 358  
 Mirabilite 425, 439  
 Molybdenite 117  
 Molybdite 197  
 Monazite 403, 420  
 Monetite 154, 392, 393, 394, 419  
 Monohydrocalcite 264, 265  
 Monosulphate 434, 438, 459, 460  
 Montebrasite 407, 420  
 Monteponite 197  
 Monticellite 290, 298  
 Montmorillonite 335, 336, 338, 339, 349, 352, 356, 357, 358  
 Mordenite 373, 374  
 Morenosite 429, 439  
 Morinite 388, 392  
 Mrazekite 358  
 Mullite 298, 358, 476, 477  
 Murmanite 298  
 Muscovite 335, 337, 339, 340, 350, 351, 353, 355, 356, 357, 358
- Nacrite 335, 340, 349, 358  
 Nahcolite 154, 259, 260, 261  
 Nantokite 116  
 Narsarsukite 327  
 Nasonite 299  
 Natroalunite 439  
 Natrochalcite 439  
 Natrolite 165, 368, 373  
 Natron 262  
 Natrophilite 420  
 Neotocite 359  
 Nepheline 369, 370  
 Nepouite 358  
 Neptunite 326  
 Nesquehonite 264, 265, 266  
 Newberyite 398  
 Nickelhexahydrite 429  
 Nimite 358  
 Nitratine 409  
 Nitre 410  
 Nitrokalite 410  
 Nitronatrite 409  
 Nobleite 221, 223, 224

- Nocerite (Noceran) 212  
 Nontronite 335, 338, 339, 355, 358  
 Norbergite 290, 298  
 Norsethite 258  
 Northupite 272  
 Nosean 372  
 Nsutite 197  
  
 Octacalcium phosphate 393, 395  
 Okenite 456  
 Olivenite 133, 399  
 Olivine 75, 288, 289, 298  
 Opal 368, 369  
 Ordoñezite 412  
 Orpiment 117, 131  
 Orthite see allanite  
 Orthoclase 370  
 Orthoserpentine 348  
 Otavite 239, 240  
 Oxammite 118  
  
 Palmierite 433  
 Palygorskite 353, 359  
 Pandermite 224  
 Paragonite 335, 351, 358  
 Parahilgardite 223  
 Parahopeite 397, 419  
 Paramontroseite 196  
 Pargasite 314  
 Parisite 272  
 Pascoite 409  
 Pectolite 327  
 Pennine (penninite) 342, 343, 347, 353  
 Pentlandite 138, 142, 144  
 Periclase 184, 196, 475  
 Perovskite 43, 133, 183, 189, 196  
 Perrierite 299  
 Petalite 352, 367, 369, 371  
 Pharmacolite 393  
 Pharmacosiderite 405  
 Phenakite 294, 376, 377, 378  
 Phengite 339, 350, 351, 358  
 Phillipsite 373  
 Phlogopite 334, 335, 336, 337, 345, 346, 351, 355, 358  
 Phosgenite 272  
 Phosphocristobalite 400  
 Phosphosiderite 402, 419  
 Phosphotridymite 400, 419  
 Pickeringite 434, 435, 439  
 Picromerite 431, 432, 439  
 Piemontite 296, 299  
 Pinakiolite 212  
 Pinnoite 213, 218  
 Pirssonite 270  
 Plagioclase 97  
 Plagionite 117  
 Plattnerite 197  
  
 Plumbogummite 404  
 Plumbojarosite 433  
 Poitevinite 439  
 Pollucite 164, 165, 371, 372  
 Polyadelphite 298  
 Polyhalite 434, 439  
 Polyolithionite 349, 350, 357  
 Powellite 130, 427, 440  
 Prehnite 359  
 Preobrazhenskite 221, 224  
 Priceite 220, 224  
 Priorite 413  
 Probertite 224  
 Prochlorite see ripidolite  
 Prosopite 172  
 Pseudomalachite 397  
 Pseudowollastonite 326  
 Psilomelane 197  
 Pucherite 400  
 Purpurite 400  
 Pyrite 117  
 Pyrochlore 412, 413, 420  
 Pyromorphite 390, 419  
 Pyrope 291, 297, 298  
 Pyrophyllite 335, 338, 340, 349, 350, 357, 358  
 Pyrosmalite 359  
 Pyroxene 133  
 Pyroxmangite 327  
  
 Quartz 134, 183, 355, 366, 367, 368, 369, 487  
 $\beta$ -Quartz 134, 366  
  
 Raimondite 431, 439  
 Ramsayite 327  
 Ramsdellite 197  
 Rankinite 296, 299  
 Raspite 133, 427  
 Realgar 117, 131  
 Rectorite 335, 349, 355, 357, 358  
 Reedmergnerite 375, 376  
 Retgersite 429  
 Reyerite 456, 457  
 Rhodizite 216  
 Rhodochrosite 239, 240  
 Rhodonite 298, 327  
 Rhombojacobsite 197  
 Richterite 314, 327  
 Riebeckite 314, 316, 318, 323, 324, 325, 327  
 Rinkite 298  
 Ripidolite (prochlorite) 342, 353  
 Riversideite 454  
 Rockbridgeite 404  
 Römerite 435  
 Roselite 392  
 Röttisite 358  
 Rubellite 376  
 Rutherfordite 273  
 Rutile 43, 133, 183, 185, 186, 194, 196

- Sakhaite 224  
 Sal ammoniac 101, 102, 168  
 Samarskite 413  
 Sanbornite 327, 352, 359  
 Sanidine 90, 96, 370  
 Sanjuanite 402  
 Sanmartinite 440  
 Saponite 334, 335, 337, 345, 352, 358  
 Sarkinite 399  
 Sassolite 216  
 Satimolite 224  
 Scapolite 372  
 Scarbroite 271  
 Scawtite 456  
 Scheelite 130, 427, 438, 439, 440  
 Schizolite 327  
 Schorl 376  
 Schorlomite 291, 298  
 Schroëckingerite 272  
 Schuchardtite 358  
 Schuetteite 439  
 Scolecite 367, 368, 374  
 Scorodite 133, 401, 402  
 Searlesite 375, 376  
 Seidozerite 299  
 Selenium 498  
 Sellaite 116  
 Semseyite 117  
 Senarmontite 197  
 Sepiolite 353, 359  
 Septechlorite 342, 347, 348, 358  
 Serendibite 376  
 Serpentine 342, 343, 348, 478  
 Serpierite 434  
 Sheridanite 342  
 Shortite 256  
 Siderite 239, 240  
 Siderotil 429, 439  
 Sillimanite 292, 293, 298, 379  
 Sihalite 216  
 Sjögrenite 271  
 Smectites 338, 356  
 Smithsonite 239  
 Sodalite 367, 372, 378  
 Spessartine 290, 291, 297, 298  
 Sphaerocobaltite (cobaltocalcite) 239, 240  
 Sphalerite see blende  
 Sphene 298  
 Spinel 91, 189, 191, 192, 195, 196, 477  
 Spodosite 392  
 Spodumene 327  
 $\beta$ -Spodumene 371  
 Staurolite 298  
 Steenstrupine 298  
 Stevensite 358  
 Stibnite 117  
 Stichtite 271  
 Stülbite 373  
 Stillwellite 375, 376  
 Stilpnomelane 359  
 Stishovite 369, 487  
 Stolzite 130, 427, 440  
 Strengite 402, 419  
 Strontianite 240, 242, 243, 245, 246  
 Struvite 401, 406, 420  
 Suanite 207, 215  
 Sudoite 342  
 Sulfohalite 439  
 Sussexite 215, 216  
 Svabite 390  
 Svanbergite 420, 433  
 Sylvine 116  
 Symplectite 399  
 Synadelphite 399  
 Syngenite 432, 433, 439  
 Szájbelyite 213, 215, 216  
 Szmikite 439  
 Szomolnokite 439  
 Talc 310, 333, 334, 335, 337, 344, 345, 358  
 Tantalite 413  
 Taranakite 404, 414, 419  
 Tarapacaite 425, 440  
 Tarbuttite 397  
 Teepleite 216, 217, 218  
 Tephroite 288, 298  
 Tertschite 213, 224  
 Teschemacherite 269  
 Thalenite 299  
 Thaumassite 298  
 Thenardite 425, 439  
 Thermonatrite 262  
 Thomsonite 373  
 Thoreaulite 413  
 Thorianite 197  
 Thorite 298  
 Thorosteenstrupine 298  
 Thortveitite 64, 77, 79, 81, 295, 296, 299  
 Tienshanite 376  
 Tincalconite 221, 224, 225  
 Tirolite see tyrolite  
 Tobermorite 454, 455  
 Topaz 297, 298  
 Torbernite 408  
 Tosudite 358  
 Tourmaline 326, 374, 375, 376  
 Tremolite 318, 320, 326, 327  
 Trevorite 197  
 Tridymite 368, 369  
 Trimerite 371, 377  
 Triphylite 407, 420  
 Triphylline 407  
 Triplite 397, 419  
 Tripliodite 397, 419  
 Tripuhyite 412  
 Tritomite 376

- Trögerite 408  
 Trona 152, 154, 262  
 Truscottite 456, 457  
 Tschermigite 433, 439  
 Tsumebite 405  
 Tunellite 221, 224  
 Tunisite 270, 271  
 Turquoise 404, 420  
 Tyrolite (tirolite) 405  
 Tysonite 116  
 Tyuyamunite 392
- Ulexite (boronatrocaltite) 221, 224  
 Ulvospinel 196  
 Uraninite 197  
 Uranocircite 408  
 Uranophane 298  
 Uranopilite 431  
 Uvarovite 290, 291, 297, 298
- Valentinite 197  
 Vanadic ocher 196  
 Vanadinite 390, 391  
 Vanthoffite 432  
 Variscite 401, 402, 414, 419  
 Varlamoffite 172  
 Vaterite 133, 246, 247  
 Veatchite 220, 225  
 Vermiculite 334, 337, 353, 356, 357  
 Villiamite 116  
 Vivianite 133, 397, 419  
 Vlasovite 327  
 Volborthite 398  
 Volkonskoite 358  
 Volkovskite 225  
 Voltaite 434, 439  
 Vonsenite 212
- Vorobyevite 377
- Wagnerite 397, 419  
 Walstromite 326  
 Wardsmithite 225  
 Wavellite 404, 419  
 Wegscheiderite 262  
 Weinschenkite see churchite  
 Whewellite 118  
 Whitlockite 389, 419  
 Wilkeite 454  
 Willemite 297, 298, 377  
 Willemseite 333, 334, 344, 358  
 Witherite 240, 243, 244, 245, 246  
 Wöhlerite 299  
 Wolframite 435, 438, 439, 440  
 Wollastonite 327, 455  
 Woodhouseite 420, 433  
 Wulfenite 130, 427, 438, 440  
 Wurtzite 117, 133  
 Wüstite 197
- Xanthophyllite see clintonite  
 Xenotime 130, 403, 420  
 Xonotlite 133, 144, 453, 454, 456
- Yttrialite 299
- Zaratite 268  
 Zincite 184, 197  
 Zinkosite 428  
 Zinnwaldite 358  
 Zippeite 431  
 Zircon 130, 286, 287, 294, 297  
 Zoisite 296, 298  
 Zunyite 299



# Subject Index

- Acid anions 151–161  
Acid carbonates 154, 259  
Acid germanates 157, 160  
Acid oxyhydroxides: see Hydroxides, oxyhydroxides  
Acid phosphate 159, 392, 398  
  in apatites 391, 414  
Acid silicates 157, 159, 167  
Acoustic vibrations 30, 32, 287  
Al–Si ordering 96–101  
Alum structures 433  
Aluminates 196, 446–451, 457–460  
  glassy 494  
Ammonium 102, 168, 414  
Analysis: see Quantitative; Qualitative  
Anharmonicity 44  
Anisodesmic crystals 113, 227  
Antimonates 411  
Antimonides 116  
Antimony oxide glass 494  
Antisymmetric vibrations 53  
Apatite structures 389  
Arsenates 383–408, 433  
Arsenic trioxide glass 494  
Arsenides 116  
  glassy 497  
Atomic displacements 54
- Band shape 319  
Baseline 18, 319  
Bauxite, products from 172  
Beryllium fluoride glass 495, 507  
Blende structures 94  
Body-centred cells 59  
Bond lengths and stretching frequencies 7  
Bone 274  
Borate glasses 490  
Borate-germanate glass 485  
Boric acid 209, 216  
Boric oxide glass 489, 508  
Borides 117  
Borosilicate glasses 492  
Brillouin zone 29
- Carbides 117  
Carbon dioxide in beryl and amphiboles 308  
Cation mass and frequencies 111, 277  
Cation radius and frequencies 7, 277, 288, 290
- Cation–anion interactions 288, 294  
Cation–halogen vibrations 116  
Cation–oxygen forces 288, 305  
Cation–oxygen vibrations 8, 351  
Cation–sulphur vibrations 117  
Cell dimensions and stretching frequencies 277, 290  
Chain silicates, unnamed 327  
Chain structures 61  
Chalcogenide glasses 496  
Chalcogenide minerals 117  
Chalcopyrite structure 94  
Character tables 53  
Chlorides 116  
Chromate 424–427, 438  
Classification of mineral spectra 114  
Clustering of cations 107, 312  
Collections of spectra 4, 353  
Combination frequencies 45  
Condensed structures and stretching frequencies 7, 8, 113, 294, 365  
Contaminants 22  
Coordination number and stretching frequencies 7, 8, 293  
Correlation field splitting 71  
Correlation tables 515  
Coulombic interactions 41, 76, 276  
Covalent crystals 31  
Crystal imperfections 240  
Crystal structure determination 4, 66  
Crystallization of glasses 502  
Curve-fitting 320  
Cyanides 117  
Cyclosilicates unnamed 326
- Damped harmonic oscillators 36  
Davydov splitting 71, 244, 276  
Degenerate vibrations 56  
Dehydroxylation processes 356, 357  
Density of modes 33  
Depolarization factor 123  
Deposits, sample orientation in 15  
Deuterium-for-hydrogen exchange 20, 355  
Dichroism of hydroxyl absorption 337  
Dichromates 436  
Difference bands 45  
Difference spectrometry 17  
Disorder: see Order–disorder  
Dispersion of frequencies 29, 33, 70, 506, 508

- Effective ionic charge 32, 44  
 Excitation sources (Raman) 126  
 External vibrations 8, 52, 69, 77, 351  
   mixing with internal vibrations 54, 72, 80, 286  
   of crystal water 166  
  
 Face-centred cells 59  
 Factor-group coupling 294  
 Factor-group splitting 71, 276, 288  
 Factor groups 59  
 Feldspars 96-99, 369, 370  
 Ferroelectric crystals 43  
 Fertilizers 4  
 Films 15, 16  
   sample orientation in 15  
   self-supporting 16  
 Fluorides 115  
 Forbidden bands 30  
 Force constants 74, 78, 229  
   and bond characteristics 6  
 Force field 75  
 Forms of vibrations 54, 56, 61, 65, 76  
 Frequencies  
   controlling factors: see Bond lengths, Cation radius, Cell dimensions, Coordination number, Condensed structures, Hydrogen bonding, Valency  
   of cation-halogen vibration 115  
   of cation-oxygen vibrations 8, 351  
   of cation-sulphur vibrations 117  
   of oxyanion vibrations 112  
 Frequency spectra of crystals 33, 70  
 Frequency spectra of glasses 506, 508  
 Fröhlich modes 42, 108  
 Fröhlich relation 39  
  
 Garnet structures 197, 290, 297  
 Germanates 193, 195, 197, 295, 370  
   acid 157, 160  
   glassy 484  
 Germania 485  
   glass 508  
 Glass 48, 108, 483  
   furnace bricks 196  
   surfaces 503  
  
 Halide minerals 116  
 Havelock's formula 39  
 Heterodesmic structures 113  
 High temperature spectra 11, 466  
 Homodesmic structures 113  
 Hydrogen bonding 137, 158, 318  
   bond lengths and frequencies 158, 170, 171  
   in oxygen acids and acid anions 151-161, 261  
   of ammonium 169  
   symmetric 153  
  
 Hydroxides  
   acid oxyhydroxides 154-156  
   amphoteric 144-151  
   basic 138-144  
   oxyhydroxides 144-151, 154-156  
 Hydroxyl groups  
   in amphiboles 310  
   in andalusite 298  
   in andradite 298  
   in apatites 391, 395, 414  
   in brookite 196  
   in cassiterite 196  
   in corundum 196  
   in diopside 298  
   in epidote 298  
   in feldspars 369  
   in garnet 298  
   in kyanite 298  
   in metakaolinite 356  
   in olivine 298  
   in oxides 196  
   in partially decomposed  $Mg(OH)_2$  473  
   in quartz 369  
   in rhodonite 298  
   in rutile 196  
   in silica gel 369  
   in sillimanite 298  
   in sphene 298  
   in topaz 297  
   in tourmaline 376  
   in willemite 297  
   in zircon 297  
   in zoisite 298  
 Hydroxyl librations (bending)  
   in acid salts 158-161, 393  
   in amphoteric hydroxides 150-151  
   in apatite 391  
   in basic hydroxides 143  
   in beryllium minerals 379  
   in borates 210, 217  
   in halogen hydroxides 144  
   in humite minerals 290  
   in layer silicates 337, 339, 341, 343, 344, 345, 348  
   in xonotlite 144  
 Hydroxyl stretching  
   in acid oxyhydroxides 154, 155  
   in acid salts 156-158  
   in amphiboles 310  
   in amphoteric hydroxides 147-149  
   in apatites 391  
   in basic hydroxides 142  
   in halogen hydroxides 144, 173  
   in hydrated magnesium carbonates 267  
   in layer silicates 332-343  
   in oxyhydroxides 154  
   in xonotlite 143  
 Hydroxyl translations 350

- Ice 103, 162  
 Ilmenite structures 93, 411  
 Impurity bands 46  
 Index of absorption 27, 37  
 Index of refraction 27, 37  
 Inorganic spectra collections 4  
 Internal vibrations 52, 54, 69, 77, 275  
   mixing with external 54, 72, 80, 112, 286,  
   288, 294, 400  
 Intensities  
   of hydroxyl stretch bands 314  
   of infrared bands 76, 466  
 Iron ore products 172  
 Irreducible representations 66  
 Isodesmic crystals 113  
 Isomorphous crystal series 6, 111, 288, 291,  
   377  
 Isomorphous substituents 6, 291  
 Isotopic substitutions 74, 246, 288  
  
 Jahn-Teller effect 195  
  
 Kramers-Kronig transformation 232  
  
 Lamellar structures 107  
 Lattice vibrations: see Cation vibrations and  
   External vibrations  
 Layer structures 61  
 Longitudinal frequencies 39, 40, 233, 276,  
   368  
 Longitudinal vibrations 27, 35, 186, 188, 232  
 Lorentz field 43  
 Lyddane-Sachs-Teller relation 39  
  
 Mesodesmic crystals 113  
 Metachrysotile 478  
 Metamict state 297  
 Mica flakes 17  
 Mixed crystals: see Solid solutions  
 Molybdates 424-427, 435-440  
 Molecular crystals 31, 70  
 Mulls 15  
 Multiphonon absorption 44, 133, 144, 236  
  
 Niobates 412  
 Niobium hydrated oxides 172, 173  
 Nitrides 117  
 Normal coordinate calculations 73  
  
 Olivine structures 288, 297  
 One-phonon processes 44  
 Order-disorder effects 87-110, 195  
   in beryllium silicates 378  
   in brittle micas 357  
   in carbonates 250, 265, 267  
   in cordierite 99  
   in feldspars 96, 367  
   in kaolinite 341  
   in layer silicates 334, 338, 341, 350, 357  
   in MgO 475  
   in metakaolinite 476  
   in metamict state 297  
   involving Al-Si 96-101, 335, 350  
   of protons in acid salts 159-161  
   of protons in boehmite 172  
   rotational 101-105  
   translational 105-109  
 Ordering of cations 89-101, 312  
 Orientation in deposits 15  
 Orthosilicates, unnamed 298  
 Oxidation reactions 357  
 Oxides, unnamed 90, 196  
 Oxy-anion frequencies 112  
 Oxygen-oxygen repulsion 187, 287, 290  
  
 Particle size, shape and frequencies 41, 185,  
   186, 368  
 Perovskite structures 43, 189, 196, 197  
 Phase separation 107  
 Phosphates 383-422  
   acid 159, 392, 398  
   glasses 492  
   in arsenates and vanadates 408  
 Phosphides 117  
 Picromerite structures 431  
 Pigments 4  
 Point groups 59  
 Point group to site groups correlation 62  
 Polarizability tensor 53, 123  
 Polarization field 41, 76, 186, 276  
 Polarization of Raman modes 123  
 Pressed disks  
   alkali halide 12, 194  
   dehydration in 5, 14, 221, 355, 439  
   inert 15  
   reactions in 5, 14, 217, 220, 438  
 Pressed powders 17  
 Pressure and band frequencies 235, 501  
 Proton tunnelling 160, 172, 470  
 Pyrochlore structures 94, 95, 197, 412, 413  
 Pyrosilicates 64, 77, 294  
   unnamed 298  
  
 Qualitative analysis 3  
   of arsenate-vanadate-phosphate solid solu-  
   tions 408, 414  
   of cements 445  
   of clays 353-355  
   of garnets 297  
   of olivines 297  
 Quantitative analysis 18  
   of carbonates 227, 273  
   of cement 445  
   of feldspars 370  
   of garnets 297

- Quantitative analysis—(*contd*)
- of igneous rocks 370
  - of mullite 358
  - of nepheline 370, 371
  - of olivines 297
  - of oxides 194
  - of silica species 370
- Raman scattering 53, 119
- of albite 98
  - of apatite 132
  - of carbonate minerals 129, 233–278
  - of corundum 93
  - of glasses 108, 508
  - of spinels 91, 130
  - polarization of 123
- Reduction 357
- Reflectance spectra 21, 39, 232, 234
- Rehydroxylation 356
- Ring silicates 326
- Rocksalt structures 94
- Rotational vibrations: see External vibrations
- Rusting 172
- Rutile structures 185, 412
- Salt hydrates 162
- Sample grinding 13
- Sample preparation
- for IR 12, 319, 354
  - for Raman 127
- Second order spectra: see Multiphonon absorption
- Selection rules for Raman activity 122
- Selenates 424, 426, 429, 432, 438, 439
- Selenites 426
- Selenides 116
- glassy 497
- Selenium glass 497
- Shell model 33, 76
- Silica glass 486, 508
- Silica-germania glass 486
- Silicate glasses 487, 509
- Silicides 117
- Site group 59
- to factor group correlation 62
  - splitting 62, 71, 288, 294
- Soft modes 43
- Solid solutions 87–110
- and Davydov splitting 72
  - in chrysotiles 480
  - in feldspars 96
  - in garnets 290–291
  - in layer silicates 333–340, 355
  - in olivines 288
  - in spinels 193, 195
  - isotopic 6, 74, 245, 288
  - of  $\text{AsO}_4^{3-}$ ,  $\text{PO}_4^{3-}$  and  $\text{VO}_4^{3-}$  91, 414
  - of cyclic silicate-germanate ions 75
  - of  $\text{SeO}_4^{2-}$ ,  $\text{CrO}_4^{2-}$  and  $\text{SO}_4^{2-}$  91, 438
  - one-mode and two-mode systems 106, 185
- Space groups 59
- Spectrometer IR 11, 319
- Spectrometer Raman 125
- Spinel structures 91, 93, 130, 189, 193–197
- Spurious bands 22
- Steel corrosion products 172
- Stretching frequencies: see Frequencies
- Strip silicates, unnamed 327
- Sulphides 116
- glassy 496, 497
- Summation bands 45
- Superstructure cells 94
- Symmetric vibrations 53
- Symmetry coordinates 54
- Symmetry species 53
- Szigeti's formula 44
- Tantalates 412
- Tellurates 437
- Tellurides 116
- glassy 497
- Tellurium dioxide glass 494
- Temperature and band frequencies 159, 467, 500
- Thermal decomposition of ammonium 356
- Thermal transformations 14
- Titanates 194, 196, 291
- Titanium, hydrated oxides 172, 173
- Translatory vibrations: see External vibrations
- Transverse frequencies 40, 233, 276
- Transverse vibrations 32, 35, 188, 232
- Trirutile structure 94
- Tungstates 424–427, 435, 436, 438–440
- Tutton's salts 431
- Two-phonon process: see Multiphonon absorption
- Uranyl 407, 431
- Uranates 435, 436, 440
- Uranium, hydrated oxides 172, 173
- Undamped harmonic oscillators 34
- Vacancy bands 336
- Vacuum cell 19
- Valency and stretching frequencies 7, 8
- Vanadates 383–409
- polymerized 409
- Vanadium, hydrated oxides 172, 173
- Vibrational frequencies: see Frequencies
- Vibrations of
- glasses 504
  - undimensional crystals 27

- Water 51, 161–168  
  in amphiboles 308  
  in beryl and cordierite 308  
  in boric oxide 490  
  in corundum 196  
  in crystals, 6, 116, 164–168  
  in fused silica 486  
  in ice 161  
  in layer silicates 352  
  in leucophosphate 414  
  in pressed disks 14  
  in variscite 401  
  librations of 167  
  translational vibrations 167
- Wave vector 28  
  conservation of 44
- Zirconium, hydrated oxides 172, 173