

GEOL 3010 Mineralogy Laboratory

Mineral List

The following is a list of the most important minerals to be covered in this course. You will be expected to identify these minerals in good-quality hand specimens, and you will be expected to know their chemical formulae as they are listed below. You should be familiar with the section on each mineral in the text (Klein, 2002). You will not be responsible for hand specimen identification of those marked with an asterix.

Also listed with each mineral is a three-letter abbreviation for the most mineral environment for each.

LTH - Low Temperature Hydrothermal
 HTH - High Temperature Hydrothermal
 OHY - Oxidized Hydrothermal
 BIR - Basic Igneous Rocks
 SIR Silicic Igneous Rocks
 PEG - Pegmatites
 HGM - High Grade Metamorphic
 LGM - Low Grade Metamorphic
 DSD - Detrital Sedimentary
 EVP - Evaporite

Mineral	Formula	Cryst	Env	Klein page#
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Native Elements

Gold	Au	Cubic	HTH	342
Silver	Ag	Cubic	HTH	343
Copper	Cu	Cubic	OHY	344
Sulfur	S	Orth	OHY,EVP	346
Diamond	C	Cubic	HGM	347
Graphite	C	Hex	HGM	351

Sulfides

Pyrite	FeS ₂	Cubic	HTH	364
Marcasite	FeS ₂	Orth	LTH	366
Pyrrhotite	FeS	Hex	HTH	359
Covellite	CuS	Hex	LTH	361
Chalcocite	Cu ₂ S	Orth	LTH	352
Chalcopyrite	CuFeS ₂	Tetr	LTH	357
Bornite	Cu ₅ FeS ₄	Cubic	LTH	352
Sphalerite	ZnS	Cubic	LTH	356
Galena	PbS	Cubic	LTH	355
Cinnabar	HgS	Hex	LTH	362
Realgar	AsS	Mon	LTH	362
Orpiment	As ₂ S ₃	Mon	LTH	363
Stibnite	Sb ₂ S ₃	Orth	LTH	363
Molybdenite	MoS ₂	Hex	HTH	367
Enargite	Cu ₃ AsS ₄	Orth	HTH	369
Tetrahedrite	Cu ₁₂ Sb ₄ S ₁₃	Cubic	HTH	370
Arsenopyrite	FeAsS	Mon	HTH	368

Oxides

Corundum	Al_2O_3	Trig	HGM	379
Hematite	Fe_2O_3	Trig	OHY,HGM	380
Ilmenite	FeTiO_3	Trig	BIR	383
Spinel	MgAl_2O_4	Cubic	HGM	388
Magnetite	FeFe_2O_4	Cubic	BIR	389
Chromite	FeCr_2O_4	Cubic	BIR	389
Rutile	TiO_2	Tetr	HGM	383
Pyrolusite	MnO_2	Tetr	LTH	384
Cassiterite	SnO_2	Tetr	HTH	385
Cuprite	Cu_2O	Cubic	OHY	378
Zincite	ZnO	Hex	OHY	378

Hydroxides

Brucite	$\text{Mg}(\text{OH})_2$	Trig	LGM	393
Gibbsite	$\text{Al}(\text{OH})_3$	Mon	LGM	397
Bauxite	Al hydroxides		DSD	397
Goethite	$\text{FeO}(\text{OH})$	Orth	OHY	395
Limonite	$\text{FeO}(\text{OH})n\text{H}_2\text{O}$	Amor	OHY	396

Halides

Halite	NaCl	Cubic	EVP	399
Sylvite	KCl	Cubic	EVP	400
Fluorite	CaF_2	Cubic	LTH	401

Carbonates

Calcite	CaCO_3	Trig	EVP	411
Aragonite	CaCO_3	Orth	HGM	416
Siderite	FeCO_3	Trig	LTH	414
Rhodochrosite	MnCO_3	Trig	LTH	415
Dolomite	$\text{CaMg}(\text{CO}_3)_2$	Trig	EVP	419
Malachite	$\text{Cu}_2\text{CO}_3(\text{OH})_2$	Mon	OHY	421
Azurite	$\text{Cu}_3(\text{CO}_3)_2(\text{OH})_2$	Mon	OHY	421

Borates

Kernite	Hydrous Na-borate	Mon	EVP	422
Borax	Hydrous Na-borate	Mon	EVP	423

Sulfates

Barite	BaSO_4	Orth	LTH	425
Celestine	SrSO_4	Orth	LTH	427
Anhydrite	CaSO_4	Orth	EVP	428
Gypsum	$\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$	Mon	EVP	429

Tungstates

Wolframite	$(\text{Fe},\text{Mn})\text{WO}_4$	Mon	HTH	431
Scheelite	CaWO_4	Tetr	HTH	432

Phosphates

Apatite	$\text{Ca}_5(\text{PO}_4)_3(\text{OH},\text{F},\text{Cl})$	Hex	SIR,BIR	434
Amblygonite	LiAlFPO_4	Tric	PEG	437
Turquoise	$\text{CuAl}_6\text{PO}_4(\text{OH})_2 \cdot 4\text{H}_2\text{O}$	Tric	OHY	438

Orthosilicates

Olivine Group

Forsterite	Mg ₂ SiO ₄	Orth	BIR	493
Fayalite	Fe ₂ SiO ₄	Orth	BIR	493

Humite Group	Mg hydrous silicates	OrMon	BIR	503
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Garnet Group

Pyrope	Mg ₃ Al ₂ Si ₃ O ₁₂	Cubic	HGM	495
Almandine	Fe ₃ Al ₂ Si ₃ O ₁₂	Cubic	HGM	495
Spessartine	Mn ₃ Al ₂ Si ₃ O ₁₂	Cubic	HGM	495
Grossular	Ca ₃ Al ₂ Si ₃ O ₁₂	Cubic	HGM	495
Andradite	Ca ₃ Fe ₂ Si ₃ O ₁₂	Cubic	HGM	495
Uvarovite	Ca ₃ Cr ₂ Si ₃ O ₁₂	Cubic	HGM	495

Aluminosilicate Group

Andalusite	Al ₂ SiO ₅	Orth	HGM	499
Sillimanite	Al ₂ SiO ₅	Orth	HGM	500
Kyanite	Al ₂ SiO ₅	Tric	HGM	500
Topaz	Al ₂ SiO ₄ (F,OH) ₂	Orth	HGM	501

Staurolite	Fe ₂ Al ₉ Si ₄ O ₂₃ (OH)	Mon	HGM	502
Zircon	ZrSiO ₄	Tetr	SIR	498
Titanite (Sphene)	CaTiSiO ₅	Mon	SIR	504

Sorosilicates

Epidote	Ca ₂ Al ₂ FeSi ₃ O ₁₂ (OH)	Mon	LGM	507
Vesuvianite	Ca ₁₀ (Mg,Fe) ₂ Al ₄ (SiO ₄) ₅ -(Si ₂ O ₇) ₂ (OH) ₄	Tet	HGM	509

Cyclosilicates (Ring Silicates)

Tourmaline	NaMg ₃ Al ₅ B ₃ Si ₆ O ₂₇ (OH) ₄	Trig	PEG	513
Beryl	Be ₃ Al ₂ Si ₆ O ₁₈	Hex	PEG	511

Chain Silicates (Inosilicates)

Pyroxene Group (Single-Chains)

Orthopyroxene

Enstatite	Mg ₂ Si ₂ O ₆	Orth	BIR	514
Ferrosilite	Fe ₂ Si ₂ O ₆	Orth	BIR	514

Clinopyroxene

Diopside	CaMgSi ₂ O ₆	Mon	BIR	517
Hedenbergite	CaFeSi ₂ O ₆	Mon	BIR	517
*Jadeite	NaAlSi ₂ O ₆	Mon	HGM	518
Spodumene	LiAlSi ₂ O ₆	Mon	PEG	519

Pyroxenoids (Single-Chains)

Wollastonite	Ca ₃ Si ₃ O ₉	Tric	HGM	520
Rhodonite	Mn ₅ Si ₅ O ₁₅	Tric	HTH	521
Pectolite	Ca ₂ NaH(SiO ₃) ₃	Tric	HTH	523

Amphibole Group (Double-Chains)

Anthophyllite	(Mg,Fe) ₇ Si ₈ O ₂₂ (OH) ₂	Orth	HGM	523
Tremolite	Ca ₂ (Mg,Fe) ₅ Si ₈ O ₂₂ (OH) ₂	Mon	HGM	525
Hornblende	(Na,Ca) ₂ (Mg,Fe,Al) ₅ (Al,Si) ₈ O ₂₂ (OH) ₂	Mon	HGM	526

Sheet Silicates (Phyllosilicates)

Antigorite	$Mg_3Si_2O_5(OH)_4$	Mon	LGM	528
Talc	$Mg_3Si_4O_{10}(OH)_2$	Tric	LGM	531
Kaolinite	$Al_2Si_2O_5(OH)_4$	Tric	LGM	530
Biotite	$K(Mg,Fe)_3AlSi_3O_{10}(OH)_2$	Mon	BIR	537
Muscovite	$KAl_2AlSi_3O_{10}(OH)_2$	Mon	SIR	534
Chlorite	$(Mg,Fe)_6AlSi_3O_{10}(OH)_2$	Mon	LGM	540

Framework Silicates

Silica Group

Quartz	SiO_2	Trig	SIR,DSD	543
*Tridymite	SiO_2	Tetr	SIR	547
*Cristobalite	SiO_2	Cubic	SIR	547
Opal	$SiO_2.nH_2O$	Amor	LTH	548

Feldspar Group

Alkali Feldspar

Orthoclase	$KAlSi_3O_8$	Tric	SIR	551
Microcline	$KAlSi_3O_8$	Tric	SIR	551
Sanidine	$KAlSi_3O_8$	Mon	SIR	552
Albite	$NaAlSi_3O_8$	Tric	SIR	553

Plagioclase Feldspars

Albite	$NaAlSi_3O_8$	Tric	SIR	553
Oligoclase	An_{10-30}			
Andesine	An_{30-50}			
Labradorite	An_{50-70}			
Bytownite	An_{70-90}			
Anorthite	$CaAl_2Si_2O_8$	Tric	BIR	554

Feldspathoid Group

Leucite	$KAlSi_2O_6$	Tetr	BIR	554
Nepheline	$NaAlSiO_4$	Hex	BIR	555
Sodalite	$Na_6Al_6Si_6O_{24} \cdot 2(NaCl)$	Cubic	BIR	556

Zeolite Group

Analcime	$NaAlSi_2O_6 \cdot H_2O$	Cubic	LTH	558
Stilbite	$NaCa_2Al_5Si_{13}O_{36} \cdot 14H_2O$	Mon	LTH	562
Natrolite	$Na_2Al_2Si_3O_{10} \cdot 2H_2O$	Orth	LTH	559