

THEORETICAL GEOCHEMISTRY (H. C. Helgeson)

**SPECIFIC GRAVITY, COMPOSITION, AND GRAM FORMULA WEIGHT OF
100 COMMON (?) MINERALS**

<u>Mineral Name</u>	<u>Specific Gravity</u>	<u>Element Formula</u>	<u>Oxide Formula</u>	<u>Gram Formula Weight</u>
Actinolite	2.98-3.35	$\text{Ca}_2\text{Fe}_5\text{Si}_8\text{O}_{22}(\text{OH})_2$	$2\text{CaO} \cdot 5\text{FeO} \cdot 8\text{SiO}_2 \cdot \text{H}_2\text{O}$	970.1
Albite	2.62	$\text{NaAlSi}_3\text{O}_8$	$\text{Na}_2\text{O} \cdot \text{Al}_2\text{O}_3 \cdot 6\text{SiO}_2$	262.2
Alunite	2.6-2.9	$\text{KAl}_3(\text{SO}_4)_2(\text{OH})_6$	$\text{K}_2\text{O} \cdot 3\text{Al}_2\text{O}_3 \cdot 4\text{SO}_3 \cdot 6\text{H}_2\text{O}$	414.2
Analcite	2.3	$\text{NaAlSi}_2\text{O}_6 \cdot \text{H}_2\text{O}$	$\text{Na}_2\text{O} \cdot \text{Al}_2\text{O}_3 \cdot 4\text{SiO}_2 \cdot 2\text{H}_2\text{O}$	220.2
Andalusite	3.15	Al_2SiO_5	$\text{Al}_2\text{O}_3 \cdot \text{SiO}_2$	162.0
Anglesite	6.32	PbSO_4	$\text{PbO} \cdot \text{SO}_3$	287.3
Anhydrite	2.96	CaSO_4	$\text{CaO} \cdot \text{SO}_3$	136.1
Ankerite	3.01	$\text{CaFe}(\text{CO}_3)_2$	$\text{CaO} \cdot \text{FeO} \cdot 2\text{CO}_2$	215.9
Anorthite	2.76	$\text{CaAl}_2\text{Si}_2\text{O}_8$	$\text{CaO} \cdot \text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2$	278.2
Apatite	3.15	$\text{Ca}_5(\text{PO}_4)_3\text{OH}$	$10\text{CaO} \cdot 3\text{P}_2\text{O}_5 \cdot \text{H}_2\text{O}$	502.3
Apophyllite	2.35	$\text{KCa}_4(\text{SiO}_{10})_2\text{F} \cdot 8\text{H}_2\text{O}$		
Aragonite	2.93	CaCO_3	$\text{CaO} \cdot \text{CO}_2$	100.1
Arsenopyrite	6.07	FeAsS		
Augite	3.25-3.55	$(\text{CaMgFeAl})_2(\text{SiAl})_2\text{O}_6$	$\text{CaO} \cdot (\text{MgFe})\text{O} \cdot 2\text{SiO}_2$	
Barite	4.48	BaSO_4	$\text{BaO} \cdot \text{SO}_3$	217.4
Biotite	2.8-3.4	$\text{K}(\text{MgFe})_3\text{AlSi}_3\text{O}_{10}(\text{OH})_2$	$\text{K}_2\text{O} \cdot 6(\text{MgFe})\text{O} \cdot \text{Al}_2\text{O}_3 \cdot 6\text{SiO}_2 \cdot 2\text{H}_2\text{O}$	
Boehmite	3.0	$\text{AlO}(\text{OH})$	$\text{Al}_2\text{O}_3 \cdot \text{H}_2\text{O}$	60.0
Borax	1.71	$\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$	$\text{Na}_2\text{O} \cdot 2\text{B}_2\text{O}_3 \cdot 10\text{H}_2\text{O}$	413.4
Bornite	5.07	Cu_5FeS_4		501.8
Brucite	2.39	$\text{Mg}(\text{OH})_2$	$\text{MgO} \cdot \text{H}_2\text{O}$	58.31
Calcite	2.71	CaCO_3	$\text{CaO} \cdot \text{CO}_2$	100.1
Cassiterite	6.99	SnO_2	SnO_2	150.7
Celestite	3.47	SrSO_4	$\text{SrO} \cdot \text{SO}_3$	185.7
Cerussite	6.58	PbCO_3	$\text{PbO} \cdot \text{CO}_2$	
Chabazite	2.1	$\text{CaAl}_2\text{Si}_4\text{O}_{12} \cdot 6\text{H}_2\text{O}$	$\text{CaO} \cdot \text{Al}_2\text{O}_3 \cdot 4\text{SiO}_2 \cdot 6\text{H}_2\text{O}$	446.4

Mineral Name	Specific Gravity	Element Formula	Oxide Formula	Gram Formula Weight
Chalcocite	5.5-5.8	Cu_2S		143.1
Chalcopyrite	4.1-4.3	CuFeS_2		183.5
Chlorite	2.6-3.3	$(\text{Mg}, \text{Fe})_5(\text{Al}, \text{Fe})_2\text{Si}_3\text{O}_{10}(\text{OH})_8$	$5(\text{Mg}, \text{Fe})\text{O} \cdot (\text{Al}, \text{Fe})_2\text{O}_3 \cdot 3\text{SiO}_2 \cdot 4\text{H}_2\text{O}$	555.8 (Mg)Al 713.5 (Fe)Al
Chrysocolla	2-2.5	$\text{CuSiO}_3 \cdot 2\text{H}_2\text{O}$	$\text{CuO} \cdot \text{SiO}_2 \cdot 2\text{H}_2\text{O}$	175.63
Cinnabar	8.09	HgS		232.8
Clinozoisite	3.3-3.6	$\text{Ca}_2\text{Al}_3\text{Si}_3\text{O}_{12}(\text{OH})$	$4\text{CaO} \cdot 3\text{Al}_2\text{O}_3 \cdot 6\text{SiO}_2 \cdot \text{H}_2\text{O}$	454.4
Colemanite	2.42	$\text{Ca}_2\text{B}_6\text{O}_{11} \cdot 5\text{H}_2\text{O}$	$2\text{CaO} \cdot 3\text{B}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$	411.0
Corundum	4.05	Al_2O_3	Al_2O_3	102.0
Covellite	4.6-4.75	CuS		95.6
Cuprite	6.1	Cu_2O	Cu_2O	143.1
Diaspore	3.4	$\text{AlO}(\text{OH})$	$\text{Al}_2\text{O}_3 \cdot \text{H}_2\text{O}$	60.0
Diopside	3.25-3.55	$\text{CaMgSi}_2\text{O}_6$	$\text{CaO} \cdot \text{MgO} \cdot 2\text{SiO}_2$	216.6
Dolomite	2.85	$\text{CaMg}(\text{CO}_3)_2$	$\text{CaO} \cdot \text{MgO} \cdot 2\text{CO}_2$	184.4
Enstatite	3.2-3.9	$\text{Mg}_2\text{Si}_2\text{O}_6$	$2\text{MgO} \cdot 2\text{SiO}_2$	200.8
Ulexite		$\text{Na}_2\text{Ca}_2\text{B}_{10}\text{O}_{18} \cdot 16\text{H}_2\text{O}$	$\text{Na}_2\text{O} \cdot 2\text{CaO} \cdot 5\text{B}_2\text{O}_3 \cdot 16\text{H}_2\text{O}$	810.2
Epidote	3.3-3.6	$\text{Ca}_2(\text{AlFe})_3(\text{SiO}_4)_3(\text{OH})$	$4\text{CaO} \cdot 3(\text{Al}, \text{Fe})_2\text{O}_3 \cdot 6\text{SiO}_2 \cdot \text{H}_2\text{O}$	
Fayalite	4.39	Fe_2SiO_4	$2\text{FeO} \cdot \text{SiO}_2$	203.8
Fluorite	3.18	CaF_2		78.1
Forsterite	3.22	Mg_2SiO_4	$2\text{MgO} \cdot \text{SiO}_2$	140.7
Galena	7.58	PbS		239.25
GARRELSITE		$(\text{Ba}, \text{Ca})_4\text{B}_4(\text{BO}_4)_2(\text{SiO}_4)_2(\text{OH})_2 \cdot 2\text{H}_2\text{O}$	$4(\text{BaCa})\text{O} \cdot 3\text{B}_2\text{O}_3 \cdot 2\text{SiO}_2 \cdot 3\text{H}_2\text{O}$	
Gay-Lussite		$\text{Na}_2\text{Ca}(\text{CO}_3)_2 \cdot 5\text{H}_2\text{O}$	$\text{Na}_2\text{O} \cdot \text{CaO} \cdot 2\text{CO}_2 \cdot 5\text{H}_2\text{O}$	296.1
Gibbsite	2.4	$\text{Al}(\text{OH})_3$	$\text{Al}_2\text{O}_3 \cdot 3\text{H}_2\text{O}$	78.0

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Glauconite	2.5-2.8	$(K_{1.25}Na_{0.04}Ca_{0.08})$ $(Fe^{3+}_{2.10}, Al_{0.90},$ $Mg_{0.75}Fe^{2+}_{0.35}Ti_{0.02})$ $(Si_{7.28}Al_{0.72})O_{20}(OH)_4^*$		
Goethite	3.3-4.3	$FeO(OH)$	$Fe_2O_3 \cdot H_2O$	88.8
Gypsum	2.32	$CaSO_4 \cdot 2H_2O$	$CaO \cdot SO_3 \cdot 2H_2O$	172.1
Halite	2.16	$NaCl$		58.4
Halloysite		$Al_2Si_2O_5(OH)_4 \cdot 2H_2O$	$Al_2O_3 \cdot 2SiO_2 \cdot 4H_2O$	294.1
Hematite	5.26	Fe_2O_3	Fe_2O_3	159.7
Heulandite	2.2	$CaAl_2Si_7O_{18} \cdot 6H_2O$	$CaO \cdot Al_2O_3 \cdot 7SiO_2 \cdot 6H_2O$	686.7
Hornblende	3.0-3.4	$(Ca_{1.87}Na_{0.28}K_{0.12})$ $(Ti_{0.16}Mg_{3.32}Fe^{3+}_{0.60}$ $Fe^{2+}_{0.96}Al_{0.14})[Si_6(Si_{1.04}$ $Al_{0.96})O_{22.42}](OH)_{1.57}^{**}$		
Hydromagnesite		$Mg_4(CO_3)_3(OH)_2$	$4MgO \cdot 3CO_2 \cdot H_2O$	311.2
Hydromuscovite		$HA_3Si_3O_{10}(OH)_2 \cdot H_2O$	$3Al_2O_3 \cdot 6SiO_2 \cdot 5H_2O$	378.2
Hypersthene	3.2-3.4	$(Mg, Fe)_2Si_2O_6$	$2(Mg, Fe)O \cdot 2SiO_2$	
Illite		$KA_5Si_7O_{20}(OH)_4$	$K_2O \cdot 5Al_2O_3 \cdot 14SiO_2 \cdot 4H_2O$	758.6
Ilmenite	4.75	$FeTiO_3$	$FeO \cdot TiO_2$	151.8
Jadeite	3.3	$NaAlSi_2O_6$		
Kaolinite	2.6	$Al_2Si_2O_5(OH)_4$	$Al_2O_3 \cdot 2SiO_2 \cdot 2H_2O$	258.1
Kyanite	3.63	Al_2SiO_5	$Al_2O_3 \cdot SiO_2$	162.1
Kutnahorite	3.12	$CaMn(CO_3)_2$	$CaO \cdot MnO \cdot 2CO_2$	
Laumontite	2.3	$CaAl_2Si_4O_{12} \cdot 4H_2O$	$CaO \cdot Al_2O_3 \cdot 4SiO_2 \cdot 4H_2O$	470.4
Lawsonite	3.09	$CaAl_2Si_2O_7(OH)_2 \cdot H_2O$	$CaO \cdot Al_2O_3 \cdot 2SiO_2 \cdot 2H_2O$	314.2
Leucite	2.47	$KAlSi_2O_6$	$K_2O \cdot Al_2O_3 \cdot 4SiO_2$	218.3
Lepidolite	2.85	$KLi_2Al(Si_4O_{10})(OH)_2$		
Magnesite	3.0	$MgCO_3$	$MgO \cdot CO_2$	84.3

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Magnetite	5.20	Fe_3O_4	$\text{FeO} \cdot \text{Fe}_2\text{O}_3$	231.5
Malachite	4.0	$\text{Cu}_2(\text{CO}_3)(\text{OH})_2$	$2\text{CuO} \cdot \text{CO}_2 \cdot \text{H}_2\text{O}$	205.1
Marcasite	4.89	FeS_2		120.0
Microcline	2.56	KAlSi_3O_8	$\text{K}_2\text{O} \cdot \text{Al}_2\text{O}_3 \cdot 6\text{SiO}_2$	288.4
Millerite	5.5	NiS		
Montmorillonite	2.0-2.7	$(\text{Na}, \text{Ca})^{+0.33}(\text{Al}_{2.33}\text{Si}_{3.67}\text{O}_{10}(\text{OH})_2)^{-0.33}$	$\text{Na}_2\text{O} \cdot 7\text{Al}_2\text{O}_3 \cdot 11\text{SiO}_2 \cdot 6\text{H}_2\text{O}$	257.5
Molybdenite	4.7	MoS_2		
Muscovite	2.85	$\text{KA1}_3\text{Si}_3\text{O}_{10}(\text{OH})_2$	$\text{K}_2\text{O} \cdot 3\text{Al}_2\text{O}_3 \cdot 6\text{SiO}_2 \cdot 2\text{H}_2\text{O}$	398.3
Nacolite		NaHCO_3	$\text{Na}_2\text{O} \cdot 2\text{CO}_2 \cdot \text{H}_2\text{O}$	84.0
Natrolite	2.25	$\text{Na}_2\text{Al}_2\text{Si}_3\text{O}_{10} \cdot 2\text{H}_2\text{O}$	$\text{Na}_2\text{O} \cdot \text{Al}_2\text{O}_3 \cdot 3\text{SiO}_2 \cdot 2\text{H}_2\text{O}$	380.2
Natron		$\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$	$\text{Na}_2\text{O} \cdot \text{CO}_2 \cdot 10\text{H}_2\text{O}$	286.0
Nepheline	2.60	NaAlSiO_4	$\text{Na}_2\text{O} \cdot \text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2$	142.1
Niccolite	7.78	NiAs		
Opal		$\text{SiO}_2 \cdot n\text{H}_2\text{O}$	$\text{SiO}_2 \cdot n\text{H}_2\text{O}$	$60.1 + 18n$
Orthoclase	2.56	KAlSi_3O_8	$\text{K}_2\text{O} \cdot \text{Al}_2\text{O}_3 \cdot 6\text{SiO}_2$	278.4
Paragonite		$\text{NaAl}_3\text{Si}_3\text{O}_{10}(\text{OH})_2$	$\text{Na}_2\text{O} \cdot 3\text{Al}_2\text{O}_3 \cdot 6\text{SiO}_2 \cdot 2\text{H}_2\text{O}$	382.2
Pentlandite	4.6-5.0	$(\text{Fe}, \text{Ni})_9\text{S}_8$		
Periclase	3.58	MgO	MgO	40.31
Phillipsite		$\text{KAlSi}_2\text{O}_6 \cdot 2\text{H}_2\text{O}$	$\text{K}_2\text{O} \cdot \text{Al}_2\text{O}_3 \cdot 4\text{SiO}_2 \cdot 4\text{H}_2\text{O}$	254.3
Phlogopite	2.84	$\text{KMg}_3\text{AlSi}_3\text{O}_{10}(\text{OH})_2$	$\text{K}_2\text{O} \cdot 6\text{MgO} \cdot \text{Al}_2\text{O}_3 \cdot 6\text{SiO}_2 \cdot 2\text{H}_2\text{O}$	417.3
Prehnite	2.9	$\text{Ca}_2\text{Al}_2\text{Si}_3\text{O}_{10}(\text{OH})_2$	$2\text{CaO} \cdot \text{Al}_2\text{O}_3 \cdot 3\text{SiO}_2 \cdot \text{H}_2\text{O}$	412.4
Pyrrite	5.01	FeS_2		87.9
Pyrolusite	5.06	MnO_2	MnO_2	86.9
Pyrophyllite	2.84	$\text{Al}_2\text{Si}_4\text{O}_{10}(\text{OH})_2$	$\text{Al}_2\text{O}_3 \cdot 4\text{SiO}_2 \cdot \text{H}_2\text{O}$	360.3

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Pyrrhotite	4.6	Fe_{1-x}S		
Quartz	2.65	SiO_2	SiO_2	60.1
Rhodochrosite	3.69	MnCO_3	$\text{MnO} \cdot \text{CO}_2$	
Rhodonite	3.6	MnSiO_3	$\text{MnO} \cdot \text{SiO}_2$	
Rutile	4.25	TiO_2	TiO_2	79.9
Sepiolite		$\text{Mg}_2\text{Si}_3\text{O}_8 \cdot 2\text{H}_2\text{O}$	$2\text{MgO} \cdot 3\text{SiO}_2 \cdot 2\text{H}_2\text{O}$	296.9
Serpentine	2.55	$\text{Mg}_3\text{Si}_2\text{O}_5(\text{OH})_4$	$3\text{MgO} \cdot 2\text{SiO}_2 \cdot 2\text{H}_2\text{O}$	277.1
Siderite	3.96	FeCO_3	$\text{FeO} \cdot \text{CO}_2$	115.9
Sillimanite	3.24	Al_2SiO_5	$\text{Al}_2\text{O}_3 \cdot \text{SiO}_2$	162.0
Smithsonite	4.43	ZnCO_3	$\text{ZnO} \cdot \text{CO}_2$	
Sodalite	2.3	$\text{Na}_4\text{Al}_3\text{Si}_3\text{O}_{12}\text{Cl}$	$2\text{NaCl} \cdot 3\text{Na}_2\text{O} \cdot 3\text{Al}_2\text{O}_3 \cdot 6\text{SiO}_2$	485.2
Sphalerite	4.096	ZnS		97.4
Sphene	3.5	CaTiSiO_5	$\text{CaO} \cdot \text{TiO}_2 \cdot \text{SiO}_2$	196.0
Spinel	3.58	MgAl_2O_4	$\text{MgO} \cdot \text{Al}_2\text{O}_3$	142.3
Spodumene	3.15	$\text{LiAlSi}_2\text{O}_6$		
Staurolite	3.75	$(\text{Fe}, \text{Mg})_2(\text{Al}, \text{Fe}^{3+})_9\text{O}_6$	$4(\text{Fe}, \text{Mg})\text{O} \cdot 9(\text{Al}, \text{Fe})_2\text{O}_3 \cdot$ $8\text{SiO}_2 \cdot \text{H}_2\text{O}$	
Stibnite	4.63	Sb_2S_3		
Stilbite	2.15	$\text{CaAl}_2\text{Si}_7\text{O}_{18} \cdot 7\text{H}_2\text{O}$	$\text{CaO} \cdot \text{Al}_2\text{O}_3 \cdot 7\text{SiO}_2 \cdot 7\text{H}_2\text{O}$	404.7
Strontianite	3.79	SrCO_3	$\text{SrO} \cdot \text{CO}_2$	147.6
Sylvite	1.986	KCl		74.6
Talc	2.82	$\text{Mg}_3\text{Si}_4\text{O}_{10}(\text{OH})_2$	$3\text{MgO} \cdot 4\text{SiO}_2 \cdot \text{H}_2\text{O}$	379.0
Tremolite	2.98	$\text{Ca}_2\text{Mg}_5\text{Si}_8\text{O}_{22}(\text{OH})_2$	$2\text{CaO} \cdot 5\text{MgO} \cdot 8\text{SiO}_2 \cdot \text{H}_2\text{O}$	812.4
Trona		$\text{Na}_2\text{CO}_3 \cdot \text{NaHCO}_3 \cdot 2\text{H}_2\text{O}$	$3\text{Na}_2\text{O} \cdot 4\text{CO}_2 \cdot 5\text{H}_2\text{O}$	226.4
Vermiculite	2.4	$\text{Mg}_3\text{Si}_4\text{O}_{10}(\text{OH})_2 \cdot n\text{H}_2\text{O}$	$3\text{MgO} \cdot 4\text{SiO}_2 \cdot \text{H}_2\text{O} \cdot n\text{H}_2\text{O}$	$379.3 + 18n$

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Witherite	4.31	BaCO_3	$\text{BaO} \cdot \text{CO}_2$	
Wollastonite	2.9	CaSiO_3	$\text{CaO} \cdot \text{SiO}_2$	116.2
Zircon	4.65	ZrSiO_4	$\text{ZrO}_2 \cdot \text{SiO}_2$	183.3
Zoisite	3.3	$\text{Ca}_2\text{Al}_3\text{Si}_3\text{O}_{12}(\text{OH})$	$4\text{CaO} \cdot 3\text{Al}_2\text{O}_3 \cdot 6\text{SiO}_2 \cdot \text{H}_2\text{O}$	454.4

* Average of 6 analysis taken from Deer, Howie and Zussman.

** Average of 14 analysis taken from Deer, Howie and Zussman.

Compiled by A. Nigrini (1966)