Table 1: Common Minerals in Igneous Rocks

Olivine, p. 3-13	Alkali Feldspar, p. 391-430
Titanite, p. 27-30	Plagioclase, p. 431-456
Orthopyroxene, p. 143-165	Hematite-Ilmenite, p. 540-547
Pigeonite, p. 166-169	Magnetite-Ulvospinel, p. 558-568
Clinopyroxene, p. 170-186	Apatite, p. 663-669
Amphibole, p.223-231, 248-260	Glass
Biotite, p. 279-287, 298-307	Nepheline, p. 473-485
White Micas, p. 288-295	Leucite, p. 488-495
Chlorite, Serpentine, p. 332-352	Aenigmatite, p. 221-222
Quartz, p. 457-472	Aegirine-augite, p. 196-200

Page numbers refer to the text by Deer, *et al*. (1992). Be sure to study the indicated pages in the text.

Table 2: General Mineralogical Characterization of Igneous Rocks.

Limits of Mafic Index	Rock Type
MI < 35	Felsic or leucocratic
35 < MI < 65	Mesocratic
65 < MI < 90	Mafic or melanocratic
90 < MI	Ultramafic

Table 3: Oxides reported in traditional "Complete" analyses of igneous rocks and their approximate range. Values are in weight %.

Oxide	Range	Comment
SiO_2	35% - 80%	Generally most abundant oxide with largest range.
TiO_2	0 - 5%	Minor oxide.
Al_2O_3	5% - 20%	Generally second most abundant oxide
Fe_2O_3	0 - 17%	Fe_2O_3/FeO ratio varies with weathering, oxidation and alteration.
FeO		
MnO	0 - 1%	Minor oxide
MgO	0 - 40%	Usual range is 0 - 10. High values in rare and SiO_2-poor rocks
CaO	0 - 40%	
Na_2O	0 - 10%	Most common alkali oxides. Na_2O may be lost on eruption.
K_2O	0 - 10%	
P_2O_5	0 - 5%	Minor oxide. Resides in apatite in most igneous rocks.
H_2O+	0 - 2%	Difficult to measure accurately. Driven off above 110°C.
H_2O-	0 - 1%	Absorbed H_2O. Driven off at 110°C.

Table 4: General Chemical Classification of Igneous Rocks

Class Limits	Rock Name
Wt % SiO_2 > 63%	Acidic
63% > Wt % SiO_2 > 52%	Intermediate
52% > Wt % SiO_2 > 45%	Basic
45% > Wt % SiO_2	Ultrabasic

Table 5: Thompson Components in Basalt and Amphibolite Assemblages

Initial Assemblage:			Metamorphic Assemblages:		
		Additive Components			
(Di)	Diopside	$CaMgSi_2O_6$	(Di)	Diopside	$CaMgSi_2O_6$
(An)	Anorthite	$CaAl_2Si_2O_8$	(An)	Anorthite	$CaAl_2Si_2O_8$
(Ap)	Apatite	$Ca_5P_3O_{12}(OH)$	(Ap)	Apatite	$Ca_5P_3O_{12}(OH)$
			(Tr)	Tremolite	$Ca_2Mg_5Si_8O_{22}(OH)_2$
			(Q)	Quartz	SiO_2
			(Gr)	Grossular	$Ca_3Al_2Si_3O_{12}$
		Exchange Components			
$MgCa_{-1}$		*(mc)*	$MgCa_{-1}$		*(mc)*
$Al_2Mg_{-1}Si_{-1}$		*(tk)*	$Al_2Mg_{-1}Si_{-1}$		*(tk)*
$NaSiCa_{-1}Al_{-1}$		*(pl)*	$NaSiCa_{-1}Al_{-1}$		*(pl)*
$FeMg_{-1}$		*(fm)*	$FeMg_{-1}$		*(fm)*
KNa_{-1}		*(kn)*	KNa_{-1}		*(kn)*
$MgTiAl_{-2}$		*(mt)*	$MgTiAl_{-2}$		*(mt)*
$FeAl_{-1}$		*(fa)*	$FeAl_{-1}$		*(fa)*
$MnMg_{-1}$		*(mm)*	$MnMg_{-1}$		*(mm)*
$BaCa_{-1}$		*(bc)*	$NaAlSi_{-1}$		*(ed)*
			$BaCa_{-1}$		*(bc)*

The initial, pre-metamorphic, assemblage is a hypothetical assemblage expected for a basaltic composition.

Table 6: Compositions of Three Valley Gap Amphibolites, in wt%, and their Thompson Components

	BR-2	BR-3	BR-4	BR-5
SiO_2	53.60	52.80	55.14	51.36
TiO_2	0.61	0.63	0.68	0.67
Al_2O_3	14.06	14.47	14.49	14.57
Fe_2O_3	1.04	1.22	1.30	1.29
FeO	7.33	7.75	7.71	8.35
MnO	0.17	0.12	0.12	0.18
MgO	7.92	7.33	5.98	8.16
CaO	10.83	10.65	8.93	10.42
Na_2O	1.83	2.57	2.84	2.34
K_2O	0.60	0.65	1.03	0.97
P_2O_5	0.16	0.08	0.10	0.10
Total	98.15	98.27	98.32	98.41
Thompson Components, normalized to 100 moles of oxygen atoms				
Di	3.803	6.291	2.965	8.530
An	9.603	7.760	10.249	6.075
mc	3.974	3.713	3.488	4.394
tk	-2.815	-0.289	-2.497	1.500
pl	2.593	3.512	4.083	3.510
fm	3.685	3.916	3.860	4.245
kn	0.460	0.501	0.787	0.752
mt	0.276	0.286	0.306	0.306
fa	0.471	0.555	0.586	0.590
mm	0.087	0.061	0.061	0.093
Ap	0.027	0.014	0.017	0.017

Table 7: Molar Volumes of Thompson Components (cm^3)

	Q	An	CDi	ODi	Tr	Gr	Ap
V_{ad}	22.69	100.79	66.19	66.19	272.70	125.35	159.20
mc			-3.5500	-3.5500	-4.0100	-4.0567	
tk			-2.6300	-2.6300	0.2400		
pl		-0.3600	-3.1600	-3.1600	-1.3800		
fm			2.1100	1.6400	1.9660	0.6433	
kn		8.2900			8.2900		
mt			3.9600	4.4300	4.1040	5.4267	
fa					0.4100	1.8850	
mm			1.9200	3.8380	1.9200	1.6567	
ed					2.0700		
ca			1.7575	1.7575			
bc		9.6600					
fh					-1.1200		
ch					4.6600		

CDi = Clinodiopside, ODi = Orthodiopside.

Table 8: Modes, recalculated into units of moles/100 moles of oxygen atoms, rock compositions, and Thompson components calculated from the measured modes, in volume percent, and from the measured mineral compositions.

	BR-2	BR-3	BR-4	BR-5
Plag	3.526	4.403	4.491	3.331
Cpx	1.799	1.498	2.988	1.520
Amph	2.336	1.947	2.073	2.443
Qtz	4.802	5.991	0.269	5.239
Rock Compositions calculated from modes and mineral compositions (Wt %)				
SiO_2	51.89	54.01	50.04	52.66
TiO_2	0.52	0.49	0.60	0.50
Al_2O_3	14.49	14.88	14.60	13.82
FeO	8.53	8.47	9.14	9.30
MnO	0.18	0.18	0.22	0.18
MgO	8.48	6.88	8.12	8.08
CaO	12.44	10.84	12.66	11.56
Na_2O	1.85	2.59	2.90	2.10
K_2O	0.56	0.66	0.68	0.70
H_2O+	1.05	1.01	1.04	1.09
Initial Thompson Components				
Di	8.268	5.867	13.408	7.994
An	6.299	5.100	2.444	6.505
mc	3.923	3.505	3.588	4.011
tk	0.394	-0.880	5.078	0.149
pl	2.596	3.509	3.973	2.999
fm	4.307	4.240	4.676	4.703
kn	0.434	0.502	0.530	0.542
mt	0.238	0.218	0.274	0.299
mm	0.094	0.090	0.115	0.093

Abbreviations of mineral names are from Kretz (1983) except for Amph = amphibole.