

Table 3-1 (continued)

Amphibolite dykes:

Sample numbers	141	149	158
Quartz	9	5	8
Plagioclase	25	24	30
Biotite	tr		25
Hornblende	40	60	20
Actinolite/Trem.			
Cummingtonite		1	
Anthophyllite			
Clinopyroxene			
Orthopyroxene			
Epidote			
Sphene			10
Apatite			1
Garnet			
Fe-Ti oxides	15	10	
Monazite			1
Zircon			
Chlorite	10		
Calcite	1		5
Scapolite			
Tourmaline			
Total	100	100	100



Quartzofeldspathic gneisses:

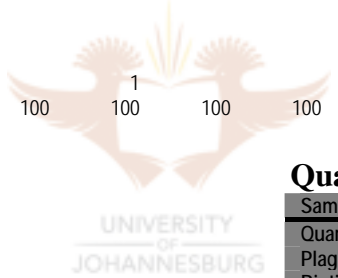
Quartzofeldspathic layers

Sample numbers	27	77	79	83A	85	88	99	101	151	153	166	172	177	189	194A	205A
Quartz	30	17	30	35	35	29	25	32	30	29	25	20	30	35	28	30
Microcline	25	30	25	20	20	30	30	15	tr	15	15	25	15			30
Orthoclase																
Perthitic																
Plagioclase	19	20	32	30	30	20	19	30	29	30	30	22	32	33	30	29
Biotite	10	7	7	7	10	7	20	10	20	7		15	15	20	25	5
Hornblende															5	
Actinolite																
Epidote														1		
Sphene					tr			1					2			
Apatite			1	1	tr		tr	1					tr	1	5	
Allanite																
Muscovite	15	5		1		3	3	1			2	2	2	5	7	3
Garnet	1	1								1						tr
Fe-Ti Oxides		10	5	5	5	10	tr	2	1		10	1	1	3		1
Zircon	tr			tr		tr										
Sericite		3	tr	1		1	3	3	10	3	3	8	3	2	tr	2
Chlorite		7						5	10	15	15	7				
Calcite								tr	tr							
Total	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Table 3-1 (continued)

Biotite and/or hornblende-rich layers

Sample numbers	26	32	33	38	41	64	76	80	142	164	174	186	191C	191D	192	193	205B	209	210
Quartz	29	30	30	33	30	35	35	30	24	25	30	33	36	30	20	26	32	32	34
Microcline		15	5		15	7	tr	tr			tr							15	5
Orthoclase																			
Perthitic																			
Plagioclase	40	35	37	40	32	33	40	36	40	35	34	40	42	34	25	35	40	35	40
Biotite		3	20	15	15		25	25	15	3	25	20			25	5	3	3	15
Hornblende	30		5	tr		25	tr		15	25			20	32	7	25	10		5
Actinolite																			
Epidote				2	2												7		
Sphene		tr	2	5	5			3			1		1		15		3		
Apatite				tr			tr	1	tr		3	1	tr		tr	1			
Allanite			tr																tr
Muscovite		1										1							
Garnet										5	7	5							
Fe-Ti Oxides	1	15	1	5	1		tr	5	5	7			1	3	7	5	5	15	
Zircon		tr	tr	tr	tr		tr									tr	tr		1
Sericite		1																	
Chlorite														1					
Calcite									1						1				
Total	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100



Marbles:

Sample numbers	62	145C	182	191B
Quartz	22	11	10	30
Microcline			tr	
Orthoclase				
Perthitic				
Plagioclase	15	10	24	
Biotite		1		
Hornblende	10	10	15	3
Actinolite/Trem.		20	10	
Clinopyroxene		15		
Orthopyroxene				
Epidote	9		10	15
Sphene	1	10	1	1
Apatite		1		
Allanite				
Muscovite				
Garnet				20
Fe-Ti Oxides	3	tr	5	
Zircon				
Chlorite				
Scapolite		2		21
Tourmaline				
Calcite	40	20	25	10
Total	100	100	100	100

Quartzite:

Sample numbers	154	181A
Quartz	41	35
Plagioclase	20	40
Biotite	7	
Apatite		5
Sillimanite		15
Chlorite	25	
Fe-Ti oxides	7	5
Zircon		tr
Total	100	100

Table 3-1 (continued)

Granodiorite plutons:

Sample numbers	46	47	57	68	96	113	120A	134A	136	162	180	188	157	160	91	92	93	130A
Quartz	30	30	36	30	29	32	33	25	25	25	28	30	30	27	35	31	38	33
Microcline	3	5	5	5		5		tr	7	tr	tr	5		7				
Orthoclase																		
Perthitic						tr									1	3	5	5
Plagioclase	35	31	40	35	30	30	40	36	29	36	35	36	29	35	40	40	45	40
Biotite	20	15	10	20	25	25	15	25	20	25	25	20	25	15	7	5	2	10
Hornblende		5	7	3	3	tr	10	2	7	3	5	5				10	tr	
Actinolite																		
Epidote		tr	1	3		1	tr	tr	1			1						
Sphene	3	7	1	3	3	2		5	7	2	5	2	5	5				
Apatite		2		tr			tr	1	1	1	1	1	3					
Allanite										tr	tr	tr	tr		1	1	3	1
Muscovite	tr											tr						
Garnet															1			1
Fe-Ti Oxides	5	5	tr	1	10	3	1	2	2				3	3	15	10	7	10
Zircon		tr	tr		tr	1	1	tr	tr	tr	tr	tr		tr	tr	tr	tr	tr
Sericite	3		tr	tr	tr	1	tr	2	5	1		tr	3	7				
Chlorite	1												tr	1	tr			
Calcite			tr				tr	2	1	3			2					
Total	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100



Gabbroic rocks:

Sample numbers	87	102	103	104
Quartz	5	5		3
Plagioclase	40	40	44	40
Biotite		5	5	7
Hornblende	25	15	20	15
Actinolite				
Clinopyroxene	15	20	20	15
Orthopyroxene				
Epidote				
Sphene	7			
Apatite			1	5
Garnet				
Fe-Ti oxides	1	15	10	15
Zircon				
Chlorite				
Scapolite	2			
Calcite	5			
Total	100	100	100	100

Other granitic intrusions:

Sample numbers	105	117	183
Quartz	25	15	30
Microcline	15	30	10
Orthoclase			
Perthite			35
Plagioclase	26	18	15
Biotite	20	15	5
Hornblende			
Actinolite			
Epidote	tr		
Sphene	5	3	
Apatite	2	1	
Allanite	1		
Muscovite	2	1	
Garnet			
Fe-Ti oxides	2	5	5
Zircon			
Chlorite	1	7	
Sericite	1	5	
Calcite			
Total	100	100	100

Table 4-1: Major and trace element analyses of the amphibolites, quartzofeldspathic gneisses, granodiorite plutons and granitoid bodies from the area of study, with their CIPW Norm calculations. (*: Total Fe as Fe₂O₃; **: Calculated with 15% of total Fe as Fe₂O₃).

Amphibolites:

Sample number RRH	28	90	138	139	141	144	149	195B	206	208	73	74	78	82	86	97
SiO ₂	50.93	51.47	45.88	56.04	45.07	45.96	47.38	47.88	45.65	48.76	56.73	51.08	53.33	46.84	53.66	58.10
TiO ₂	0.52	0.44	2.01	1.14	2.61	1.6	1.68	1.47	0.56	1.17	0.94	0.88	1.15	2.28	0.49	0.58
Al ₂ O ₃	12.78	11.68	16.52	15.95	14.41	15.68	12.65	14.96	14.9	12.72	14.38	14.50	16.74	14.22	17.52	16.63
Fe ₂ O ₃ *	11.3	8.05	13.58	7.87	14.69	10.67	12.55	13.73	11.85	13.23	9.03	11.89	8.03	14.75	9.61	7.31
MnO	0.21	0.18	0.21	0.16	0.28	0.09	0.31	0.24	0.27	0.19	0.16	0.18	0.13	0.23	0.15	0.15
MgO	8.96	6.11	8.38	4.82	7.18	8.11	9.27	8.2	5.57	10.03	2.45	7.26	6.06	6.22	5.59	3.08
CaO	11.47	17.72	9.59	6.41	9.56	9.99	10.56	9.87	18.82	11.33	14.14	9.75	11.58	10.00	11.49	12.77
Na ₂ O	2.13	4.07	2.32	3.04	2.85	2.43	1.93	2.62	0.46	1.68	1.29	2.84	2.26	2.63	1.31	1.07
K ₂ O	0.69	0	0.06	1.94	0.34	0.93	0.03	0.1	0.03	0.18	0.00	0.12	0.29	0.20	0.16	0.15
P ₂ O ₅	0.09	0.08	0.23	0.2	0.45	0.31	0.33	0.13	0.15	0.19	0.19	0.11	0.22	0.52	0.02	0.11
LOI	0.83	0.15	1.08	1.83	1.51	3.08	2.19	0.9	0.59	0.92	<u>0.61</u>	<u>0.58</u>	<u>0.80</u>	<u>0.81</u>	<u>0.58</u>	<u>0.57</u>
Total	99.92	99.96	99.88	99.39	98.97	98.85	98.88	100.11	98.86	100.4	99.93	99.28	100.58	98.69	100.56	100.53

Ba	670	88	61	419	169	1481	34	33	35	119	19	57	177	329	133	83
Rb	20	11	13	47	16	31	10	11	30	21	11	16	12	14	9	11
Sr	141	393	280	337	313	222	223	134	216	141	339	262	292	619	618	331
Y	12	6	32	22	39	21	30	26	14	23	32	222	21	38	7	9
Zr	35	42	134	99	189	123	128	90	46	83	181	53	62	81	0	50
Nb	5	4	6	9	8	6	8	7	6	7	14	9	8	9	6	8
Zn	111	74	97	47	83	74	92	113	51	107	0	68	72	110	0	61
Cu	19	54	40	0	53	36	6	145	0	49	12	0	216	51	0	0
Ni	151	41	92	66	64	84	147	85	73	135	17	68	89	50	32	20
V	305	174	305	177	342	277	187	418	261	235	152	340	242	361	299	163
Cr	747	208	169	108	167	164	224	259	328	417	34	203	276	145	104	183
Co	39	18	42	61	96	54	98	46	111	52	107	57	30	70	85	18

CIPW Norms, 100% anhydrous**

Sample number RRH	28	90	138	139	141	144	149	195B	206	208	73	74	78	82	86	97
Qtz	0	0	0	8.2	0	0	0	0	0	0	18.92	0.67	6.43		10.44	20.60
Or	4.16	0	0.36	11.85	2.09	5.99	0.19	0.6	0.18	1.08		0.73	1.73	1.22	0.95	0.89
Ab	18.35	22.4	20.09	26.52	25.05	22.36	17.06	22.6	4	14.44	11.07	24.60	19.28	23.01	11.17	9.11
An	23.69	13.71	35.3	24.88	26.51	22.77	26.92	29.32	39.56	27.06	33.91	27.09	34.96	27.30	41.76	40.37
Ne	0	6.67	0	0	0	0	0	0	0	0						
Cc	0	0	0	0	0	0	0	0	0	0						
Ac	0	0	0	0	0	0	0	0	0	0						
Ns	0	0	0	0	0	0	0	0	0	0						
Di (wo)	14.11	26.89	5.05	2.82	8.39	12.2	10.8	8.3	23.21	12.11	15.11	9.12	9.08	8.73	6.53	9.52
Di (en)	8.19	15.42	2.83	1.57	4.37	7.36	6.35	4.5	10.99	7.07	5.64	4.90	5.42	4.23	3.40	4.38
Di (fs)	5.24	10.25	2.01	1.14	3.77	4.18	3.91	3.51	11.92	4.44	9.74	3.91	3.17	4.35	2.94	5.06
Hy (en)	11.83	0	8.49	10.87	2.22	4.74	16.05	8.08	2.15	14.91	0.57	13.70	9.87	8.87	10.69	3.38
Hy (fs)	7.57	0	6.03	7.87	1.92	2.69	9.87	6.31	2.33	9.37	0.99	10.92	5.77	9.13	9.23	3.90
Ol (fo)	1.97	0	7.1	0	8.45	6.99	1.29	5.84	0.83	2.46				2.10		
Ol (fa)	1.39	0	5.56	0	8.03	4.38	0.87	5.04	1	1.71				2.38		
Mt	2.27	1.6	2.75	1.6	3.02	2.29	2.59	2.77	2.41	2.66	1.81	2.41	1.60	3.02	1.91	1.45
Il	1.01	0.84	3.91	2.24	5.16	3.31	3.34	2.85	1.09	2.26	1.81	1.71	2.21	4.48	0.94	1.11
Ap	0.2	0.18	0.51	0.45	1.02	0.74	0.75	0.29	0.34	0.42	0.42	0.25	0.48	1.18	0.04	0.24
Total	100	97.96	100	100	100	100	100	100	100	100	99.99	100.01	100.00	100.00	100.00	100.01

Table 4-1 (continued)

Granodiorite plutons:

Sample number RRH	46	57	68	88	96	113	120A	120	136	160	188
SiO ₂	68.92	69.85	69.18	78.24	60.74	59.45	63.46	62.90	69.27	72	69.57
TiO ₂	0.60	0.56	0.58	0.17	1.06	0.63	0.85	0.85	0.54	0.5	0.59
Al ₂ O ₃	14.20	14.55	14.90	12.17	17.72	15.30	15.71	15.72	14.24	14.02	14.16
Fe ₂ O ₃ *	5.15	4.66	4.66	0.78	7.58	8.97	7.39	6.79	4.39	3.2	4.68
MnO	0.11	0.10	0.10	0.05	0.10	0.13	0.14	0.12	0.1	0.08	0.08
MgO	0.76	0.67	0.76	0.04	0.63	3.68	1.56	1.19	1.02	1.18	1.03
CaO	1.87	2.47	2.87	0.83	3.85	7.43	4.15	2.61	2.7	2.45	2.43
Na ₂ O	4.66	4.28	4.11	4.56	5.64	3.87	4.40	4.74	4.88	4.34	5.14
K ₂ O	2.42	2.80	2.38	3.39	0.93	0.19	1.57	3.37	2.35	2.06	2.21
P ₂ O ₅	0.14	0.13	0.14	0.01	0.31	0.13	0.20	0.23	0.15	0.13	0.16
LOI	<u>0.51</u>	<u>0.38</u>	<u>0.45</u>	<u>0.39</u>	<u>1.94</u>	<u>0.34</u>	<u>0.61</u>	<u>1.95</u>	<u>0.6</u>	<u>0.55</u>	<u>0.49</u>
Total	99.34	100.46	100.13	100.64	100.49	100.14	100.03	100.48	100.24	100.5	100.55

Ba	549	552	521	714	230	49	411	820	489	534	504
Rb	90	68	65	56	26	10	33	73	64	58	60
Sr	135	129	128	112	194	322	172	136	152	200	139
Y	77	62	64	32	52	14	63	69	53	21	58
Zr	316	311	332	107	641	58	448	489	273	132	326
Nb	14	14	14	11	21	9	15	16	12	10	11
Zn	93	73	81	0	0	65	101	21	66	42	63
Cu	0	0	0	0	117	25	42	69	0	0	0
Ni	10	9	0	0	11	15	10	11	10	0	0
V	36	33	33	15	29	231	50	44	38	49	26
Cr	170	158	176	10	17	164	111	20	148	115	10
Co	9	10	9	122	50	20	8	86	0	0	157

CIPW Norms, 100% anhydrous**

Sample number RRH	46	57	68	88	96	113	120A	120	136	160	188
Qtz	25.51	25.96	27.04	36.83	12.48	12.95	17.72	12.43	23.43	30.73	23.04
Or	14.55	16.62	14.18	20.02	5.62	1.14	9.40	20.36	14.01	12.23	13.12
Ab	40.04	36.30	34.99	38.48	48.70	33.04	37.65	40.91	41.56	36.8	43.6
An	8.60	11.54	13.53	2.69	17.66	24.03	18.67	11.85	10.06	11.44	9.04
Ne									0	0	0
Cc	0.82	0.25	0.63		1.11			0.01	0	0.46	0
Ac									0	0	0
Ns									0	0	0
Di (wo)				0.57		5.20	0.41		1.07	0	0.89
Di (en)				0.07		2.36	0.13		0.37	0	0.3
Di (fs)				0.56		2.81	0.29		0.73	0	0.61
Hy (en)	1.93	1.68	1.91	0.03	1.61	6.94	3.81	3.04	2.2	2.96	2.29
Hy (fs)	6.06	5.38	5.37	0.27	8.55	8.26	8.35	7.88	4.35	3.52	4.71
Ol (fo)									0	0	0
Ol (fa)									0	0	0
Mt	1.03	0.92	0.92	0.14	1.52	1.79	1.47	1.36	0.87	0.63	0.92
Il	1.16	1.07	1.11	0.32	2.06	1.21	1.64	1.65	1.03	0.95	1.13
Ap	0.31	0.28	0.31	0.02	0.69	0.29	0.44	0.51	0.33	0.28	0.35
Total	100.01	100.00	99.99	100.00	100.00	100.02	99.98	100.00	100	100	100

Gabbro:

Sample number RRH	10	104
SiO ₂	51.65	45.93
TiO ₂	0.60	3.12
Al ₂ O ₃	14.01	15.49
Fe ₂ O ₃ *	7.39	16.28
MnO	0.14	0.42
MgO	9.99	4.01
CaO	13.02	9.05
Na ₂ O	1.81	4.21
K ₂ O	0.29	0.36
P ₂ O ₅	0.04	1.37
LOI	<u>1.32</u>	<u>0.42</u>
Total	100.27	100.66

Ba	141	2664
Rb	13	14
Sr	357	764
Y	11	49
Zr	12	114
Nb	5	12
Zn	47	135
Cu	84	0
Ni	149	0
V	205	66
Cr	1536	58
Co	37	16

Sample number RRH	10	104
Q	0.79	
Or	1.75	2.15
Ab	15.56	33.58
An	29.72	22.54
Ne		1.32
C		
Ac		
Ns		
Di (wo)	14.94	6.17
Di (en)	10.13	2.33
Di (fs)	3.63	3.94
Hy (en)	15.28	
Hy (fs)	5.48	
Ol (fo)		5.47
Ol (fa)		10.22
Mt	1.48	3.26
Il	1.16	6.00
Ap	0.09	3.03
Total	100.01	100.01

