up into the constriction; after stirring, the plunger can be lowered gently to the bottom of the tube.

The entire device is then centrifuged for an appropriate length of time. When removed from the centrifuge, the float portion is in the collar and the sink portion at the bottom of the test-tube. If the plunger is then grasped at its upper end and pulled upward it will close the collar and lift collar and contents out of the test-tube, leaving the sink portion at the bottom.

The components are preferably made of glass and the over-all size can be made to fit the tube-holder in use. The length of the collar relative to the tube may be varied depending on the amount of the sink fraction expected. Incidentally, the inner collar may be made from a test-tube having a smaller diameter than the outer one.

THE DISTRIBUTION OF MAJOR AND MINOR ELEMENTS AMONG SOME CO-EXISTING FERROMAGNESIAN SILICATES

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In a recent paper[1] the author discussed the distribution of some elements in co-existing biotite, hornblende and chlorite. Due to space considerations, the average values for each element were given, rather than the results of the separate spectrographic analyses. It has since been requested that the individual analyses be published to permit other workers to reanalyze the data for their own purposes.

In the following tables the atomic fractions of the elements in their sites in the mineral structures are given for each of the minerals analyzed. These have been recalculated from the weight percentages determined spectrographically. For the minor elements, below each table are given their minimum, maximum, and average amounts, in parts per million.

[1] Nickel, E. H., *Am. Mineral.*, **39**, 486–493 (1954).

TABLE 1. THE ATOMIC FRACTIONS OF ALUMINUM IN TETRAHEDRAL POSITIONS
Total Al/Al & Si is given in brackets

Sample No.	Al in Hornblende	Al in Biotite	Al in Chlorite
S-133-35	0.130	—	0.290 (.429)
S-133-37	.105	—	.350 (.460)
S-133-42	.101	0.413	.325 (.464)
S-133-99	.113	.377	—
S-133-102	.098	.412	—
S-133-121	—	.390	.270 (.438)
S-133-142	.088	.341	—
T1-50W	.101	.384	—
T1-40W	.087	.394	—
T1-10W	.091	.326	—
T1-0	.091	.326	—
T1-30E	—	.422	.265 (.451)
T1-40E	—	.382	.295 (.480)
T1-50E	.112	.409	—
T4-43W	.139	—	.285 (.464)
T4-50W	.131	.433	.290 (.481)

TABLE 2. THE ATOMIC FRACTIONS OF IRON AND MAGNESIUM IN OCTAHEDRAL POSITIONS

Sample No.	Fe in Hornblende	Fe in Biotite	Fe in Chlorite	Mg in Hornblende	Mg in Biotite	Mg in Chlorite
S-133-35	0.197	—	0.218	0.684	—	0.576
S-133-37	.195	—	.203	.760	—	.606
S-133-42	.180	0.312	.208	.712	.616	.592
S-133-99	.200	.330	—	.708	.563	—
S-133-102	.184	.350	—	.710	.622	—
S-133-121	—	.269	.204	—	.579	.569
S-133-142	.193	.256	—	.772	.626	—
T1-50W	.208	.319	—	.748	.636	—
T1-40W	.200	.298	—	.706	.616	—
T1-10W	.204	.336	—	.698	.649	—
T1-0	.199	.301	—	.736	.589	—
T1-30E	—	.291	.206	—	.699	.552
T1-40E	—	.220	.181	—	.693	.469
T1-50E	.214	.298	—	.700	.689	—
T4-43W	.218	—	.210	.782	—	.542
T4-50W	.218	.290	.216	.798	.636	.516

TABLE 3. THE ATOMIC FRACTIONS OF COBALT, NICKEL AND CHROMIUM IN OCTAHEDRAL POSITIONS

Sample No.	$Co \times 10^{-4}$ in Hornblende	$Co \times 10^{-4}$ in Biotite	$Co \times 10^{-4}$ in Chlorite	$Ni \times 10^{-3}$ in Hornblende	$Ni \times 10^{-3}$ in Biotite	$Ni \times 10^{-3}$ in Chlorite	$Cr \times 10^{-3}$ in Hornblende	$Cr \times 10^{-3}$ in Biotite	$Cr \times 10^{-3}$ in Chlorite
S-133-35	1.02	—	1.27	1.34	—	1.79	1.10	—	1.74
S-133-37	1.03	—	0.840	1.51	—	2.21	1.26	—	2.80
S-133-42	0.636	0.687	0.793	0.87	2.09	1.96	0.76	4.47	1.42
S-133-99	1.35	1.93	—	1.25	2.18	—	1.05	4.10	—
S-133-102	1.25	1.63	—	1.15	2.03	—	.990	4.40	—
S-133-121	—	1.90	1.74	—	1.76	1.83	—	3.14	1.38
S-133-142	1.27	1.68	—	1.34	2.48	—	1.25	5.70	—
T1-50W	1.14	1.84	—	1.21	2.25	—	0.796	3.04	—
T1-40W	0.776	1.84	—	0.794	2.31	—	0.491	5.17	—
T1-10W	0.958	2.39	—	0.978	2.60	—	0.604	4.53	—
T1-0	1.10	1.72	—	1.09	2.22	—	0.630	3.24	—
T1-30E	—	1.94	1.26	—	2.18	1.73	—	3.29	1.17
T1-40E	—	1.65	0.866	—	2.08	1.15	—	3.00	0.99
T1-50E	1.21	2.04	—	1.92	2.27	—	0.806	2.30	—
T4-43W	1.87	—	2.11	1.87	—	2.50	1.80	—	4.00
T4-50W	1.60	1.96	1.57	1.69	2.21	2.17	1.72	6.10	7.00

	Cobalt Content (p.p.m.)			Nickel Content (p.p.m.)			Chromium Content (p.p.m.)		
	Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum	Average
Hornblende	22	64	41	280	640	440	150	550	310
Biotite	26	90	69	660	980	830	770	2040	1350
Chlorite	48	126	79	690	1490	1150	530	3700	1360

TABLE 4. THE ATOMIC FRACTIONS OF TITANIUM, VANADIUM AND MANGANESE IN OCTAHEDRAL POSITIONS

Sample No.	$Ti\times10^{-2}$ in Hornblende	$Ti\times10^{-2}$ in Biotite	$Ti\times10^{-2}$ in Chlorite	$V\times10^{-4}$ in Hornblende	$V\times10^{-4}$ in Biotite	$V\times10^{-4}$ in Chlorite	$Mn\times10^{-3}$ in Hornblende	$Mn\times10^{-3}$ in Biotite	$Mn\times10^{-3}$ in Chlorite
S-133-35	1.22	—	0.982	5.88	—	3.90	4.38	—	2.94
S-133-37	1.02	—	.809	5.36	—	3.87	4.32	—	2.99
S-133-42	1.10	2.46	.466	4.52	6.64	3.07	4.72	4.49	3.30
S-133-99	0.973	1.99	—	5.32	6.80	—	4.60	3.66	—
S-133-102	0.765	2.19	—	4.58	7.20	—	4.58	4.23	—
S-133-121	—	2.51	.286	—	9.44	2.61	—	3.50	3.46
S-133-142	0.983	2.64	—	4.90	7.87	—	4.62	3.31	—
T1-50W	0.666	2.11	—	4.36	9.60	—	5.12	3.60	—
T1-40W	0.812	2.23	—	3.18	9.53	—	4.48	3.28	—
T1-10W	0.815	1.92	—	3.84	12.1	—	4.42	3.48	—
T1-0	0.760	2.00	—	3.82	8.33	—	4.62	3.96	—
T1-30E	—	1.76	.433	—	9.07	2.60	—	3.53	3.24
T1-40E	—	1.68	.244	—	8.77	1.58	—	3.63	3.23
T1-50E	0.888	2.12	—	4.08	6.67	—	4.74	3.73	—
T4-43W	0.795	—	.536	7.54	—	3.67	5.56	—	3.24
T4-50W	0.788	2.17	.307	6.62	8.13	2.30	5.58	3.93	3.02

	Titanium Content (p.p.m.)			Vanadium Content (p.p.m.)			Manganese Content (p.p.m.)		
	Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum	Average
Hornblende	1900	3500	2500	83	196	130	1420	1780	1550
Biotite	5300	8200	6600	190	276	233	1150	1480	1290
Chlorite	1200	4800	2500	72	181	135	1590	1930	1770

TABLE 5. THE ATOMIC FRACTIONS OF ZIRCONIUM AND SCANDIUM IN OCTAHEDRAL POSITIONS

Sample No.	$Zr \times 10^{-4}$ in Hornblende	$Zr \times 10^{-4}$ in Biotite	$Zr \times 10^{-4}$ in Chlorite	$Sc \times 10^{-4}$ in Hornblende	$Sc \times 10^{-4}$ in Biotite	$Sc \times 10^{-4}$ in Chlorite
S-133-35	3.30	—	1.40	2.05	—	0.157
S-133-37	2.50	—	1.19	1.34	—	.140
S-133-42	2.60	1.82	1.18	1.66	0.380	<.1
S-133-99	3.36	1.62	—	1.50	<.1	—
S-133-102	3.22	1.78	—	1.63	.149	—
S-133-121	—	2.09	1.18	—	.483	.141
S-133-142	2.58	1.91	—	1.57	.344	—
T1-50W	3.18	1.57	—	1.42	.240	—
T1-40W	2.10	1.70	—	0.942	.318	—
T1-10W	2.52	1.47	—	1.76	.270	—
T1-0	2.68	1.97	—	0.993	.272	—
T1-30E	—	2.05	1.14	—	.680	.241
T1-40E	—	2.15	0.816	—	.740	.185
T1-50E	2.48	2.16	—	0.946	.250	—
T4-43W	1.80	—	0.633	1.45	—	<.1
T4-50W	1.34	0.824	0.406	1.30	.173	<.1

	Zirconium Content (p.p.m.)			Scandium Content (p.p.m.)		
	Minimum	Maximum	Average	Minimum	Maximum	Average
Hornblende	71	183	141	25	55	38
Biotite	48	132	104	n.d.	22	10
Chlorite	38	129	93	n.d.	10	5