

Baskell's Glass

Eugene Jarosewich Chemical Analysis of Five Minerals for Microprobe Standards

There is a growing need for the availability of reliable microprobe standards for chemical analysis of various materials, in our particular case for the analysis of minerals.

Unfortunately, there are a very limited number of acceptable standards. Perhaps one of the main reasons for this is lack of homogeneous materials, an essential property of microprobe standards. Homogeneity should be the micron level, and the material should be stable under the electron beam. Also, there

should be sufficient material for a chemical analysis.

We have analyzed five minerals which have been successfully used as microprobe standards. These standards served very well in plotting the calibration curves with standards from other sources, and excellent results were obtained. Nevertheless, we still are contemplating a more thorough study of homogeneity. These standards were obtained by crushing hand specimens of a rock or mineral and then selecting a fraction between 80 and 60 mesh for heavy liquid and Franz magnetic separations. Each sample was visually inspected for impurities. In this manner between 0.8 g to 1.5 g of sample was obtained. Approximately 20 grains of each sample were mounted on a one-inch

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TABLE 1.—Chemical analyses of minerals for use as microprobe standards (weight percent)

Constituent	Kakanui Hornblende	Kakanui Pyrope	Omphacite (USNM 110607)	Garnet (USNM 87375)	Garnet (USNM 110752)
SiO ₂	40.37	41.46	55.42	39.47	40.16
Al ₂ O ₃	14.90	23.73	8.89	22.27	22.70
Fe ₂ O ₃	3.30	N.D.	1.35	2.77	2.17
FeO	7.95	10.68	3.41	13.76	9.36
MgO	12.80	18.51	11.57	6.55	7.17
CaO	10.30	5.17	13.75	14.39	18.12
Na ₂ O	2.60	N.D.	5.00	N.D.	N.D.
K ₂ O	2.05	N.D.	0.15	N.D.	N.D.
H ₂ O+	0.90	N.D.	N.D.	N.D.	N.D.
H ₂ O-	0.04	<0.01	0.02	<0.01	<0.01
TiO ₂	4.38	0.47	0.37	0.39	0.35
P ₂ O ₅	0.00	N.D.	N.D.		
MnO	0.09	0.28	0.10	0.59	0.19
Total	99.66	100.30	100.03	100.19	100.22

X4.

glass and checked for major elements homogeneity on the microprobe. The chemical analyses were performed employing classical methods (Hillebrand 1953 and Peck 1964). Sodium and potassium were determined by flame photometry.

Omphacite USNM 110607 was separated from eclogite, garnet USNM 87375 and garnet USNM 110752 were separated from kyanite eclogite, all from Robert Victor Mine, South Africa. Kakanui hornblende and pyrope were prepared from nodules described by Brian Mason (1966).

Literature Cited

- Hillebrand, W. F., G. E. F. Lundell, H. A. Bright, and J. I. Hoffman
1953. *Applied Inorganic Analysis*. 2nd edition, 1034 pages. New York: Wiley and Sons.
- Mason, B.
1966. Pyrope, Augite and Hornblende from Kakanui, New Zealand. *New Zealand Journal of Geology and Geophysics*, 9.
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1964. Systematic Analysis of Silicates. *Geological Survey Bulletin*, 1170.

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EARTH SCIENCES

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Spencer Loh

William G. Melson
EDITOR

Mineral Sciences
Investigations,
1969-1971

SMITHSONIAN INSTITUTION PRESS
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1972

YES
DIFFERENT COUNTING TIME?
NEW SAMPLE?YES
INPUT SAMPLE DESCRIPTION (OPTIONAL)?ZASBS
SELECT ANALYSIS POINT: PUSH BUTTON
BEAM CURRENT= 39288

SAMPLE ZASBS

	WT. %	SIGMA %	FORMULA	K-RATIO	PEAK CTS	BKGD
TI	0.06	17.83	0.006	0.0015	1181	924
MN	0.75	3.55	0.092	0.0540	1276	180
NA	0.00	22.22	0.000	0.0000	282	400
SI	39.90	0.91	5.789	0.9549	23738	80
AL	25.51	1.35	4.361	0.6759	9224	29
CA	35.82	0.35	5.568	1.7977	226711	1132
FE	1.71	3.43	0.208	0.0235	1395	216
MG	0.00	13.78	0.000	0.0000	473	724
K	0.00	151.51	0.000	0.0000	656	680
TOTAL	103.76	OXY = 24	ITERATIONS: 2			

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ANOTHER POINT?