



CCRMP
Canadian Certified Reference Materials Project

CANMET Mining and Mineral Sciences Laboratories
555 Booth Street, Ottawa, Ontario, Canada K1A 0G1
Tel.: (613) 995-4738, Fax: (613) 943-0573
E-mail: ccrmp@nrcan.gc.ca
www.ccrmp.ca

PCMRC
Projet canadien de matériaux de référence certifiés

Laboratoires des mines et sciences minérales de CANMET
555, rue Booth, Ottawa (Ontario) Canada K1A 0G1
Tél. : (613) 995-4738, Téléc. : (613) 943-0573
Courriel : pcmrc@nrcan.gc.ca
www.pcmrc.ca

Certificate of Analysis

First issued: March 2001

Version: May 2007

KZK-1

Acid Base Accounting Material

Table 1a - KZK-1 Certified values

Test	Units	Mean	Between-Labs SD	Within-Lab SD	95% confidence interval of mean
Sulphur	%	0.80	0.04	0.01	± 0.01

Table 1b - KZK-1 Method-specific values

Test	Units	Mean	Between-Labs SD	Within-Lab SD	95% confidence interval of mean
AP-S	kgCaCO ₃ /t	24.9	1.3	0.3	± 0.3
NP-MS-s	kgCaCO ₃ /t	58.9	1.6	1.0	± 1.1
NP-S-m	kgCaCO ₃ /t	64.8	7.6	5.8	± 5.8
NP-S-s	kgCaCO ₃ /t	59.0	3.8	1.9	± 2.8

Table 2 - Legend for acid base accounting methods

Acronym	Sobek and Modified Sobek methods
AP	Acid potential
NP	Neutralization potential
S	Sobek method
MS	Modified Sobek method
m	Moderate fizz rating
s	Slight fizz rating



Table 3 - KZK-1 provisional value

Test	Units	Mean	Between-Labs SD	Within-Lab SD	95% confidence interval of mean
Paste pH	pH	8.8	0.21	0.05	± 0.09

Table 4 - KZK-1 informational values for acid base accounting parameters

Test	Units	Mean	SD
AP-MS	kgCaCO ₃ /t	24.6	1.2
NP-MS-m	kgCaCO ₃ /t	61.6	3.4
S(SO ₄)	%	0.01	-

Table 5 - KZK-1 informational values for elements

Element	Unit	Mean	SD
Al	%	7.37	0.51
Ba	%	0.27	0.00
C	%	0.95	0.03
Ca	%	1.80	0.10
CO ₂	%	3.37	0.21
CO ₃	%	4.22	0.68
Fe	%	3.30	0.19
K	%	3.55	0.01
Loss on ignition	%	4.26	0.24
Loss of moisture	%	0.07	0.05
Mg	%	0.95	0.08
Mn	%	0.07	0.01
Na	%	1.18	0.24
P	%	0.08	0.00
Si	%	29.38	0.36
Ti	%	0.35	0.01

SOURCE

KZK-1 is a mixture of drill cores from the copper-lead-zinc project at the Kudz Ze Kayah property in the southeastern Yukon Territory, Canada, and was donated by Cominco Limited, Vancouver, British Columbia, Canada.

DESCRIPTION

KZK-1 is a sericite schist. The rock is composed of quartz, albite, muscovite, biotite, rutile, ilmenite, ankerite, calcite, monazite, zircon, pyrite and pyrrhotite. Trace amounts of calcite, clinocllore, kaolinite and sphalerite are present.

INTENDED USE

KZK-1 is suitable for the analysis of rocks for sulphur and various static acid base accounting tests by the Sobek and modified Sobek methods as described in reference 1. Examples of intended use are for quality control in the analysis of samples of a similar type, method development, environmental assessment and the calibration of equipment.

INSTRUCTIONS FOR USE

KZK-1 should be used "as is", without drying. The contents of the bottle should be thoroughly mixed before taking samples. The contents of the bottle should be exposed to air for the shortest time possible. Unused material should be stored under an inert gas in a desiccator, or in a new, heat-sealed laminated foil pouch. The values herein pertain to the date when issued. CANMET is not responsible for changes occurring after receipt by the user.

METHOD OF PREPARATION

The raw material was crushed, ground, sieved to minus 74 μm , blended and blended to obtain a sub-74 micron (-200 mesh) product which was bottled in one size, 100-gram units. Each bottle was sealed under nitrogen in a laminated aluminum foil-mylar pouch to prevent oxidation.

HOMOGENEITY

The homogeneity of the stock with respect to various parameters implicated in acid base accounting was investigated using twenty-two bottles chosen according to a stratified random sampling scheme. Two splits were analysed from each bottle. The analyses for iron and sodium using direct instrumental neutron activation were performed by an external laboratory for 1-g samples. At CANMET a combustion apparatus was used for 0.5-g samples for the assessment of carbon and sulphur. Silicon, aluminum, potassium, titanium and barium were analysed by fusion followed by inductively coupled plasma - atomic emission spectroscopy with 0.2-g samples at an external laboratory. Use of a smaller sub-sample will invalidate the use of the certified value and associated parameters. A one-way analysis of variance technique (ANOVA) was used to assess the homogeneity of these elements⁽²⁾. The ratio of the between-bottles to within-bottle mean squares was compared to the F statistic at the 95% level of probability. No evidence of inhomogeneity was observed for these nine elements.

CERTIFICATION

Twenty-six industrial, commercial, and government laboratories participated in an interlaboratory certification program. Various parameters for acid base accounting were analyzed by methods of each laboratory's choice. A one-way analysis of variance technique was used to estimate the consensus value and other statistical parameters⁽²⁾. The concentration of sulphur was certified. Provisional status was given to paste pH. Four parameters for acid base accounting were given "method-specific" values. "Method-specific" refers to the use of Sobek and modified Sobek methods for acid base accounting, as described in reference 1. The term "method-specific" is not equivalent to "certified." Informational values for three acid base accounting parameters and sixteen elements were derived from the mean of the results from fewer than 4 laboratories.

Full details of all phases of the work, including statistical analysis, the methods and the names of the participating laboratories are contained in CCRMP Report 01-1E, Version 2.

CERTIFICATION HISTORY

KZK-1 was originally released in March 2001. This version of the certificate, the second, was issued due to the expiration of the first version. Upon a reassessment of the data, the means remained unchanged, but the between-laboratory and within-laboratory standard deviations and 95% confidence intervals were changed for some parameters.

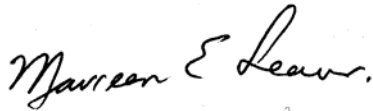
PERIOD OF VALIDITY

This certificate is valid until December 31, 2030. The stability of the material will be monitored every two years for the duration of the inventory. Updates will be made via the CCRMP web site.

LEGAL NOTICE

CANMET has prepared this reference material and statistically evaluated the analytical data of the interlaboratory certification program to the best of its ability. The purchaser, by receipt hereof, releases and indemnifies CANMET from and against all liability and costs arising out of the use of this material and information.

CERTIFYING OFFICER



Maureen E. Leaver

FOR FURTHER INFORMATION

The KZK-1 certification report is available free of charge upon request to:

Sales Officer, CCRMP
CANMET-MMSL (NRCAN)
555 Booth Street
Ottawa, Ontario, Canada K1A 0G1
Telephone: (613) 995-4738
Facsimile: (613) 943-0573
E-mail: ccrmp@nrcan.gc.ca

REFERENCES

1. Coastech Research (1991), Acid Rock Drainage Prediction Manual, the Mine Environment Neutral Drainage (MEND) Program (Project 1.16.1b).
2. Brownlee, K.A., Statistical Theory and Methodology in Science and Engineering; John-Wiley and Sons, Inc.; New York; 1960.