McGill University Geochemical Laboratories

Contact Information

Geochemical Laboratories
Earth & Planetary Sciences
McGill University
3450 University Street
Montreal, QC, H3A 2A7, Canada

Phone: (514) 398-4881
Fax: (514) 398-4680

Email: geochem@eps.mcgill.ca

Analytical Procedure

Crushing and Grinding:

The sample was reduced to less than 5mm diameter pieces by jaw crusher,. With the rusting pieces further reduced by case hardened mild steel grinding barrels. The usual grinding time, as well as the maximum grinding time for unaltered acidic rocks is 120 seconds. For altered rocks, especially altered basic and ultrabasic rocks the optimum grinding time was just less than the time when the rock powder starts to smear and cake on the walls of the grinding barrel, but not less than 90 seconds in any case. To minimize inter-sample contamination, samples were grouped by rock type, graded between the groups, whenever possible, and the grinding barrels were primed with a fraction of the sample that was then disposed of or cleaned by silica sand between each sample.

Instruments

PHILIPS PW2440 4kW automated XRF spectrometer system with a Rhodium 60kV end window x-ray tube, five x-ray detectors, four primary beam filters, eight analysing crystals, two fixed channels for simultaneous measurement of Na and F, and PW2540 168 sample X-Y autochanger. AFT 6000/C automated fusion preparation system. HERZOG HTP 40 Pelletizing Press

Sample Preparation

The Major Elements (Si, Ti, Al, Fe, Mn, Mg, Ca, Na, K and P) and the trace elements Ba, Ce, Co, Cr, Cu, Ni, Sc, V and Zn were analysed using 32mm diameter fused beads prepared from a 1:5 sample: lithium tetraborate mixture. Other trace elements, from F to U, were determined by analysing 40mm diameter pressed pellets prepared at a pressure of 20 tons from a mixture of 10g sample powder with 2g Hoechst Wax C Micropowder.

Calibration

Calibration lines were prepared using between 15 to 40 International Standard Reference Materials (Geostandards Newsletter, XVIII, Special Issue, July 1994).

Mass Absorption Corrections

All concentration values were corrected for mass absorption effects by using a combination of alpha coefficients and/or Compton scatter (in cases where the concentration was less than 1000ppm, etc.).

Accuracy

The accuracy for Silica was within 0.5%. For the other major elements it was within 1%. For trace elements the accuracy was within 5%. The limiting factor for accuracy was the degree

of scatter of analyses from which the consensus values were determined (Geostandards Newsletter, XVIII,2, 1994, p 256, see values for Nb as an example).

Precision

Instrument precision: within 0.3% relative, generally within 0.23% relative. This was the percent relative variation obtained when the same disc was analysed repeatedly for the same element. Overall precision for beads and pressed pellets: within 0.5% relative. This was determined by repeatedly analysing two beads or pressed pellets prepared from two different aliquots removed from the same sample powder vial during the same day and used to prepare a fused bead or pressed pellet by an experienced operator using the routine procedure.

NB: The above accuracy and precision values apply only when the concentration for a particular element exceeds its quantitation limit (ACS Committee on Environmental Improvement, 1980), which was defined as the 10 sigma value of the background for it.

Detection Limits

SiO_2	60 ppm	Ni	3 ppm
TiO_2	35 ppm	Sc	10 ppm
Al_2O_3	120 ppm	V	10 ppm
Fe_2O_3	30 ppm		
MnO	30 ppm		
MgO	95 ppm		
CaO	15 ppm		
Na_2O	75 ppm		
K_2O	25 ppm		
$P2O_5$	35 ppm		
Cr_2O_3	15 ppm		
LOI	100 ppm		