SGS	**Geochemistry** **Global**	Doc Type **Method Summary** Method No: Code **GO_XRF72** Service **Testing** Issued Date **June 2021** Approved by **K. Williams**
Natural Resources	**Determination of Major Element Oxides in Oxidic Materials by Borate Fusion and WD Xray Fluorescence Spectrometry**	

1. **Parameter(s) measured, unit(s):**
   Aluminum Oxide (Al_2O_3), Calcium Oxide (CaO), Chromium (III) Oxide (Cr_2O_3), Iron (III) Oxide (Fe_2O_3), Magnesium Oxide (MgO), Manganese Oxide (MnO), Phosphorus Pentoxide (P_2O_5), Potassium Oxide (K_2O), Silicon Dioxide (SiO_2), Sodium Oxide (Na_2O), Titanium Dioxide (TiO_2), Vanadium Oxide (V_2O_5), LOI, in %

2. **Typical sample size:**
   0.2 to 0.5g

3. **Type of sample applicable (media):**
   Rocks, oxide ores, concentrates and catalysts

4. **Sample preparation technique used:**
   Samples are crushed and pulverized according to client specified instructions or default preparation procedures. This method is used to report, in percentage, the whole rock suite (Al_2O_3, CaO, Cr_2O_3, Fe_2O_3, MgO, MnO ,Na_2O, K_2O, P_2O_5, , SiO_2, TiO_2, V_2O_5), Sample preparation entails the formation of a homogenous glass disk by the fusion of the sample and a lithium tetraborate/lithium metaborate mixture. The LOI is determined separately and gravimetrically at 1000°C.

5. **Method of analysis used:**
   The prepared disks are analyzed by wavelength dispersion X-ray fluorescence (WD-XRF). The LOI is included in the matrix correction calculations, which is performed by the XRF software.

6. **Data reduction by:**
   The results are exported via computer, on line, data fed to the SGS Laboratory Information Management System (SLIM) with secure audit trail.

7. **Figures of Merit:**
   This method has been fully validated for the range of samples typically analyzed. Method validation includes the use of reference materials, replicates, duplicates and blanks to calculate accuracy, precision, linearity, range, limit of detection, reporting limit, specificity and measurement uncertainty.

The Reporting Limit has been determined as follows:

Element	Reporting Limit (%)	Upper Limit (%)
Al_2O_3	0.01	100
CaO	0.01	60
Cr_2O_3	0.01	5
Fe_2O_3	0.01	100
MnO	0.01	93
MgO	0.01	100
Na_2O	0.01	60
K_2O	0.01	70
P_2O_5	0.01	55
SiO_2	0.01	100
TiO_2	0.01	100
V_2O_5	0.01	10

8. Quality control:

Quality control materials include method blanks, duplicates and reference materials and are randomly inserted with the frequency set according to method protocols at ~11% for ore grade analysis. Quality control materials will also include preparations blanks and replicates if samples have been taken through the sample reduction process. Calibration materials that cover the range upon method set-up; calibration check performed daily.

9. Accreditation:

SGS Natural Resources conforms to the requirements of ISO/IEC 17025. Scopes of Accredited tests are site specific, please visit https://www.scc.ca/en/search/laboratories