

ANALYSIS REPORT

April 19th, 2018

Your reference: TCN_522_na_20180127 sand sample A44 (11-Apr-2018)

Our reference: 1804AE01

Sample	Analysis	Date of analysis
TCN_522_na_20180127 sand sample A44 (11-Apr-2018)	ICP-OES analysis after fusion in Li-metaborate/tetraborate and dissolution in HNO ₃ – calibration against SRM’s (standard reference materials). LOI: weight loss after heating (3h) to 1050°C : see table 1	17/04/2018
TCN_522_na_20180127 sand sample A44 (11-Apr-2018)	XRF analysis after fusion in Li-metaborate/tetraborate for the production of a glass bead – calibration against SRM’s (standard reference materials). LOI: weight loss after heating (3h) to 1050°C : see table 1	18/04/2018
TCN_522_na_20180127 sand sample A44 (11-Apr-2018)	XRD analysis: The sample was mixed and milled with an internal standard material (Zincite) in a McCrone micronizing mill in ethanol. They were then loaded in X-ray diffraction sample holders and measured by X-ray diffraction. The quantification was of the minerals was performed by the Rietveld method ¹ . The diffraction pattern is shown in Figure 1. The quantitative mineralogical composition of the sample is given in Table 2.	16/04/2018

¹ During a Rietveld refinement, an XRD pattern is 'calculated' based on the structure models of the minerals present as they are found in literature or in databases (ICSD). The calculated pattern is then fitted to the measured pattern by refining the structure parameters etc.. Quantitative phase contents can be derived from the so-called 'scale factors' which are refined during the procedure.

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Table 1: Overview of the analysis results of the chemical analysis.

	Unit	TCN_522_na_20180127 sand sample A44 (11-Apr-2018)	TCN_522_na_20180127 sand sample A44 (11-Apr-2018)
Method		ICP-OES	XRF
SiO₂	%	97.84	97.98
Al₂O₃	%	0.75	0.80
Fe₂O₃	%	0.50	0.35
CaO	%	<0.01	0.22
MgO	%	0.03	0.04
Na₂O	%	0.01	<0.01
K₂O	%	0.27	0.23
Ti₂O	%	0.14	0.16
P₂O₅	%	0.02	0.01
Mn₂O₃	%	0.01	0.01
Cr₂O₃	%	0.07	0.01
LOI*		0.13	0.13

*Loss on Ignition

Table 2: Minerals present in the sample (data in weight percentages).

Mineral	Theoretical formula ²	TCN_522_na_20180127 sand sample A44 (11-Apr-2018)
Silicates		
Quartz	SiO ₂	97.1
Plagioclase	(Ca,Na)(Si,Al) ₄ O ₈	1.1
Alkali feldspar	(K,Na)Si ₃ AlO ₈	1.7
Oxides		
Rutile	TiO ₂	0.1

² These formulae are theoretical formulae. The composition of the specific minerals in this sample, can differ from these compositions (within certain limits).

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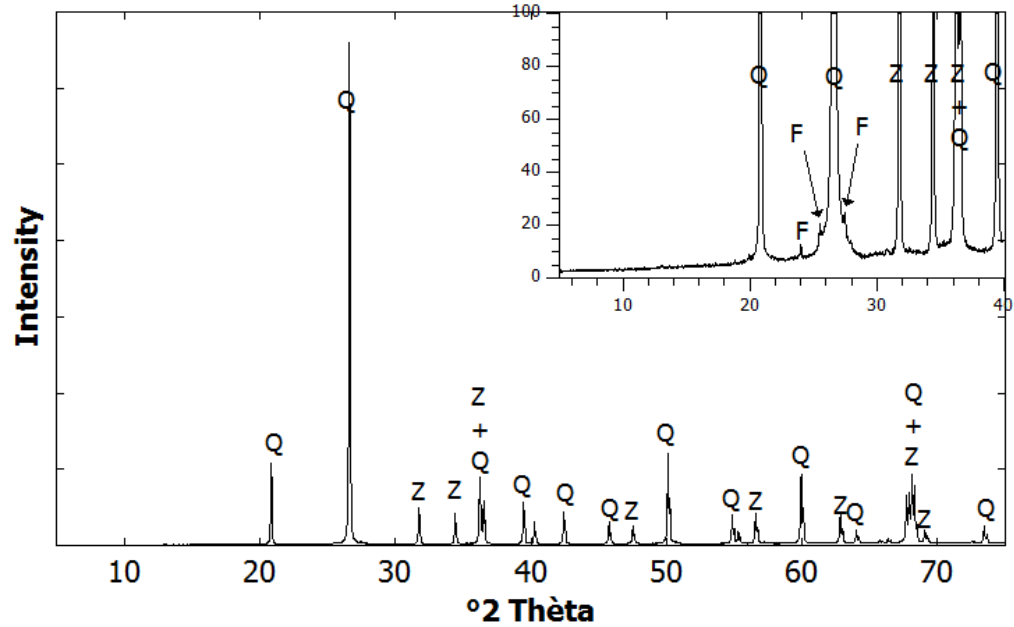


Figure 1: Diffraction pattern of the sample. An internal standard (indicated with “Z”) was added to the sample. The other minerals that contribute to the most important reflections are indicated: Quartz (Q), Feldspars (F – both Alkalifeldspar and Plagioclase). In the upper right corner, a magnification of the diffraction pattern around the main Quartz reflection is shown. The (relatively) small reflections of the feldspars can be seen in this inset.