Semi-Quantitative Analysis of Lens in Welded Tuff

Introduction

Welded tuff is a congelation of pyroclastic flow. It consists mainly of two components: a). lens, which is a glassy material, and b). base, which has a composition similar to ash. Since the lens showed the essence of the magma, its determination is especially important. Previously, this lens material had to be removed from the base for analysis. This destroyed the natural sample state. Now, with the use of the Rigaku **ZSX100e** equipped with a CCD camera and sample stage driving mechanism, it is possible to analyze the lens material in its normal state.

1. Sample preparation and equipment

1.1 Equipment

Rigaku / Sequential XRF model **ZSX100e**

X-ray tube : 4kW, End window, Rh target

Sample observation system : CCD camera

Analysis point positioning : By sample stage

Analysis area : 1 mm dia.

1.2 Sample preparation

Sample surface was cleaned and set into a holder.

1.3 Measurement condition

Element	F~Mg	Al, Si	P, S	Cl	K, Ca	Ti~U
kV – mA	30-120	30-120	30-120	30-120	40-90	50-72
Slit	Standard	Standard	Standard	High resol.	Standard	Standard
Crystal	TAP	PET	Ge	Ge	LiF200	LiF200
Detector	F-PC	F-PC	F-PC	F-PC	F-PC	SC
PHA	Diff.	Diff.	Diff.	Diff.	Diff.	Diff.
X-ray path	Vac.	Vac.	Vac.	Vac.	Vac.	Vac.

2. Measurement result

The black part in welded tuff is called the lens, and the gray part is called the base. Qualitative analysis and semi-quantitative analysis using FP method were performed on both lens and base with a 1 mm dia. analysis area.

As the result of qualitative analysis, it can be said that light elements, such as Na, are detected with good sensitivity, and spectra in the heavy element range, energies are close can be separated well. These are basic features of WDXRF.

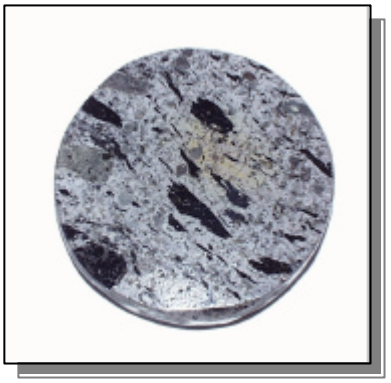

Fig.-1 Welded tuff (Mt. Aso, Japan)

Table-1 Semi-Quantitative result of lens and base parts

	Lens part	Base part
Na2O	4.4	4.3
MgO	0.20	0.51
Al2O3	18.0	19.0
SiO2	66.0	66.0
K2O	5.4	3.8
CaO	3.6	3.6
Fe2O3	1.8	2.2

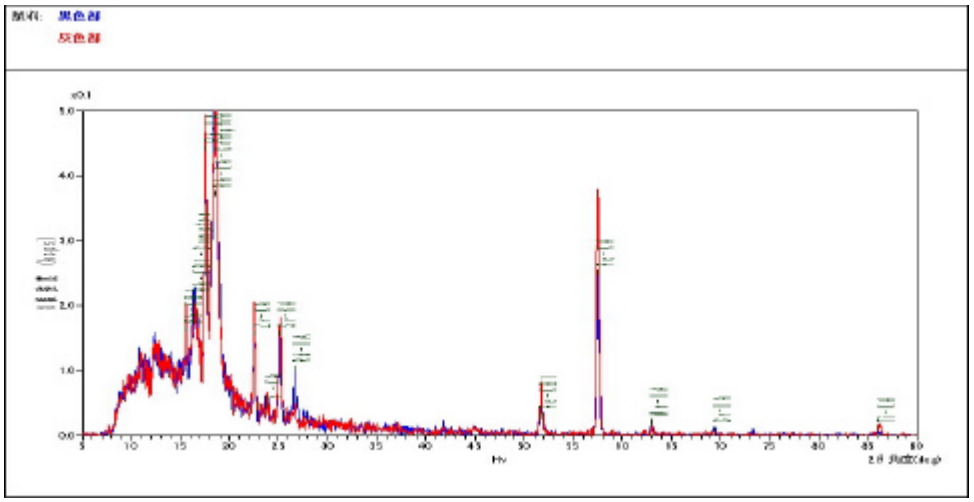

Chart-1 Qualitative chart of lens (blue) and base (red)

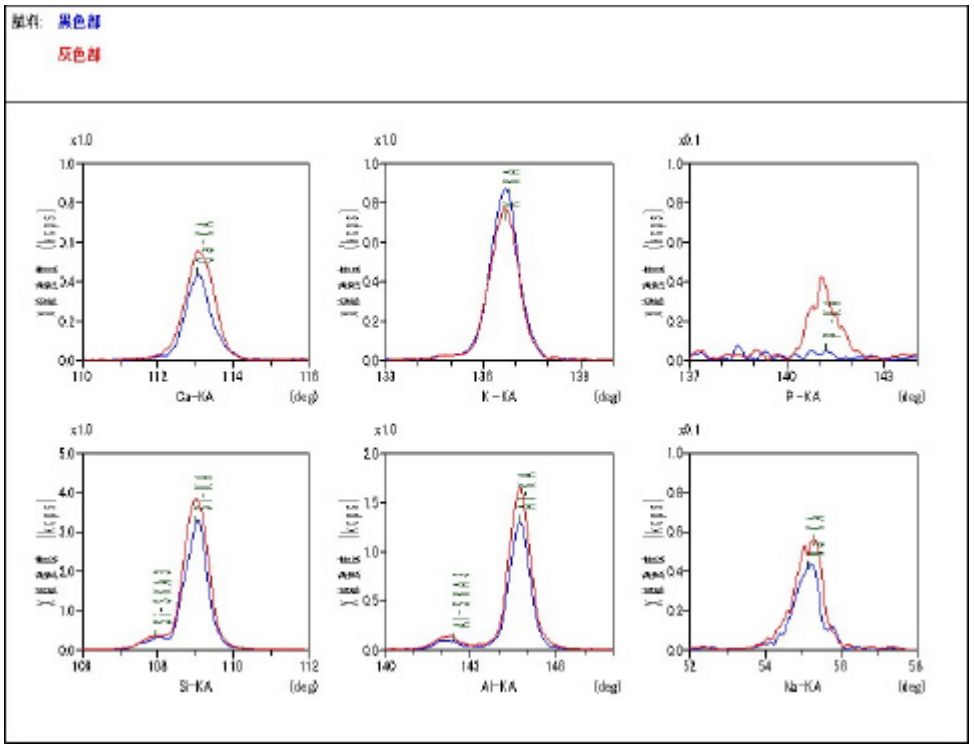

Chart-2 Qualitative chart of lens (blue) and base (red)

3. Summary

It is well known that rock sample analysis is affected by mineral effects. Usually, a powdered sample should be fused to reduce these effects. In this experiment, as the lens is in a glass form and it is desirable to keep the sample intact, the analysis was performed without removing this glassy fraction.sample is expected to be kept as it is, analysis was made without removing glass part. This type of analysis should have a large number of applications to diverse fields.

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