



## Reference Material Data Sheet

# IAG ORPT-1 Rhyolite

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### Description of the reference material

*IAG ORPT-1 is a calc-alkaline rhyolite from Pontiac Township, Ontario, Canada. It was produced at the Ontario Geological Survey as part of the Certified Ontario Reference Materials Programme (Richardson, J.M. 1995. Analyst v.120, p. 1513), during which it was named ORCA-1. The test material was evaluated for homogeneity by the originator and as a result, the sample was considered suitable for use as a GeoPT proficiency testing sample. The material was characterised as a reference material using the GeoPT37/2015 round of the International Association of Geoanalysts' GeoPT proficiency testing scheme. The Proficiency Testing Steering Committee for this round was Prof. M. Thompson (statistician), Dr P.C. Webb (results coordinator), Prof. P.J. Potts and Dr M. Burnham.*

### Intended use

*This reference material is designed for use by laboratories undertaking the determination of the major and trace element mass concentration fractions of silicate rocks and similar materials for the calibration of a measurement system, the assessment of a measurement procedure, assigning values to other materials, and quality control. Note that the material may be used only for a single purpose in the same measurement process. For example, it must not be used for calibration and method validation at the same time.*

### Minimum sample size

*On the basis of the homogeneity results and an assessment of the methods used to contribute results to the GeoPT37 round, the minimum sample size recommended for use as a test portion is 0.2 g.*

### Period of validity

*Provided the storage and handling conditions are met, this reference material is not expected to deteriorate with time. On exposure to air, the material may absorb moisture, and instructions for handling must be followed.*

### Storage information

*Store in a sealed container in a cool dry environment.*

### Instructions for handling

*Before any measurements are made, every portion of the test sample must be dried at  $105 \pm 5$  °C for at least 2 hours. Avoid contamination and cross-contamination of the test material.*

IAG ORPT-1 Rhyolite								
Reference values								
Measurand	Reference value	Uncertainty (expanded)	n		Measurand	Reference value	Uncertainty (expanded)	n
	g/100 g	g/100 g				mg/kg	mg/kg	
<b>SiO<sub>2</sub></b>	74.84	0.10	91		<b>La</b>	27.0	0.4	71
<b>TiO<sub>2</sub></b>	0.298	0.003	98		<b>Li</b>	6.1	0.3	36
<b>Al<sub>2</sub>O<sub>3</sub></b>	12.55	0.05	98		<b>Lu</b>	1.21	0.03	54
<b>Fe<sub>2</sub>O<sub>3</sub>T</b>	2.91	0.02	98		<b>Mo</b>	4.4	0.3	46
<b>MnO</b>	0.060	0.001	98		<b>Nb</b>	11.6	0.4	65
<b>CaO</b>	1.14	0.01	98		<b>Nd</b>	34.8	0.6	66
<b>Na<sub>2</sub>O</b>	4.59	0.03	97		<b>Pb</b>	5.0	0.3	69
<b>K<sub>2</sub>O</b>	2.14	0.01	97		<b>Pr</b>	8.20	0.10	56
<b>P<sub>2</sub>O<sub>5</sub></b>	0.057	0.001	89		<b>Rb</b>	52.1	0.7	70
	mg/kg	mg/kg			<b>Sc</b>	7.3	0.3	57
<b>Ba</b>	374	5	81		<b>Sm</b>	8.95	0.13	61
<b>Be</b>	1.39	0.04	38		<b>Sn</b>	3.5	0.2	40
<b>Bi</b>	0.09	0.02	23		<b>Sr</b>	71.6	1.1	81
<b>Ce</b>	62.1	1.0	71		<b>Ta</b>	0.99	0.04	45
<b>Co</b>	3.0	0.1	63		<b>Tb</b>	1.8	0.03	53
<b>Cs</b>	0.60	0.02	46		<b>Th</b>	4.91	0.11	65
<b>Cu</b>	12.0	0.6	71		<b>Tm</b>	1.19	0.02	49
<b>Dy</b>	11.7	0.3	55		<b>U</b>	1.29	0.04	58
<b>Er</b>	7.60	0.14	54		<b>V</b>	10.2	0.5	68
<b>Eu</b>	1.32	0.02	55		<b>Y</b>	70.8	1.3	76
<b>Ga</b>	16.0	0.4	67		<b>Yb</b>	7.85	0.13	61
<b>Gd</b>	9.87	0.17	56		<b>Zn</b>	51.2	0.9	80
<b>Hf</b>	7.5	0.3	53		<b>Zr</b>	246	4	76
<b>Ho</b>	2.53	0.03	53					

*Reference values* are the GeoPT assigned values assessed from the robust statistical analysis of results submitted to the GeoPT37 round, following an assessment of both the consistency of data distribution and the agreement between methods, where possible.

*Uncertainties* are the robust standard deviation of the mean or median of the assigned value expanded by a coverage factor of two, and rounded up.

*n* is the number of laboratories reporting results for that element/oxide in the GeoPT37 round.

*Fe<sub>2</sub>O<sub>3</sub>T* is the total iron expressed as Fe<sub>2</sub>O<sub>3</sub>.

### Assessment of reference values

The reference values were determined as a 'consensus', based on the statistical location of the participants' results to the GeoPT37 round. This location was determined as a robust mean if the distribution of results was unimodal and, outliers aside, close to symmetrical. If a slight asymmetry was apparent in a unimodal distribution, the median was chosen as an alternative. In other circumstances, notably when the number of valid results contributing to the location was less than 15 or their dispersion was unusually great, no reference value was assigned, although values may be reported as information values. These judgements were made by the IAG Proficiency Testing Steering Committee.

<b>IAG ORPT-1 Rhyolite</b>			
<b>Information values</b>			
<b>Measurand</b>	<b>Information value</b>	<b>Uncertainty (expanded)</b>	<b>n</b>
	<i>g/100 g</i>	<i>g/100 g</i>	
<b>MgO</b>	0.47	0.01	97
<b>LOI</b>	0.77	0.02	79
	<i>mg/kg</i>	<i>mg/kg</i>	
<b>Cd</b>	0.10	0.02	30
<b>Cr</b>	65	3	77
<b>Ge</b>	1.5	0.2	22
<b>In</b>	0.06	0.01	8
<b>Ni</b>	6.0	0.5	63
<b>Tl</b>	0.20	0.02	29
<b>W</b>	0.88	0.13	30

**Information values** are 'provisional' data from the relevant GeoPT report with additional 'information' values for elements that gave a reasonably cohesive data distribution. In both cases, data distributions were judged **not** to be good enough to meet the criteria for designation as reference values. These data are provided for information purposes only and **not** for the calibration of methods or the assessment of data.

**Uncertainties** are the robust standard deviation of the mean or median expanded by a coverage factor of two, and rounded up.

**n** is the number of laboratories reporting results for that element/oxide in the GeoPT37 round.

**LOI** is the loss on ignition.

### **Metrological traceability**

Traceability was not formally demonstrated for this reference material. However, traceability could be demonstrated by the laboratories participating in this round by the use of certified reference materials as calibrators or for performance assessment (although this information is not currently recorded by the GeoPT programme). Furthermore, traceability is implied by the overall agreement between datasets for individual elements/oxides submitted by laboratories that contributed to the GeoPT programme.

### **Reference to reference material characterisation report**

Further details of the procedures used, the results, their statistical analysis and assessment, on which the property values listed in this certificate are based, can be found in the GeoPT37 report, which can be downloaded free of charge for personal use (<http://www.geoanalyst.org/index.php/proficiency-testing-proficiency-testing>).

### **Safety information**

Silicate powders containing heavy metals can cause harm especially if inhaled or in contact with the skin. User organisations must undertake a health and safety risk assessment and ensure that the appropriate procedures are followed in the handling and use of this material. Further details are available on the relevant Material Safety Data Sheet.

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## **Revisions**

*This Reference Material Data Sheet is Version 1.00. Any revisions to this reference material data sheet will be made available on the IAGeo Ltd web site ([www.iageo.com](http://www.iageo.com)).*

## **Acknowledgements**

*The contributions of Marcus Burnham and colleagues at the Ontario Geological Survey, Canada in providing and processing the sample and Peter Webb in providing data for and reviewing this data sheet are gratefully acknowledged.*

## **Approvals**

*This reference material information sheet was approved on behalf of the Reference Material and Certification Committee of the International Association of Geoanalysts.*

**Name** Philip J. Potts      **Position** Chair of the IAG Certification  
and Reference Material Committee      **Date** 21<sup>st</sup> December 2015

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