Certified Reference Material

Certificate of Analysis

Manufacturers Details

KLEN International (74) Pty Ltd
36 Hemisphere Street
Neerabup, Western Australia, 6031

PO Box 529
Wanneroo WA 6946

Concentration of Certified Analyte/s

Au	**0.518 g/t (ppm)**
Pt	**0.459 g/t (ppm)**
Pd	**0.466 g/t (ppm)**
CRM Type Oxide	

Identifiers

Batch number :	74421
Lab ID (LIMS):	KO74421
Stock Keeping Unit (SKU) (2kg jar) :	21003211
SKU (30g sachet) :	21003213
SKU (50g sachet) :	21003215
SKU (150g sachet) :	21003217
Date of Manufacture :	April 2017
Period of Validity :	36 months

NB: For ease of documentation, only the larger pack size is referenced throughout the CoA. However, product making up all jars and sachets originate from the same batch number.

Intended Use

This product is for use as a reference material for monitoring and testing the accuracy of laboratory analysis of minerals and ores.

Analyte Data Table

Analyte	Certified Value g/t	Measurement Uncertainty g/t	Number of ISO/IEC 17025 Certified Laboratories
Gold	0.518	0.009	13
Platinum	0.459	0.015	13
Palladium	0.466	0.014	14

Notes related to information contained in the Analyte Data Table

Certified Value – (CV) is the mean of means from accepted values of all participating round robin laboratories.

Measurement Uncertainty - (MU) is a statistical measure of the variability associated with multiple procedures used, between unit and within unit inhomogeneity, and changes during storage and transport (unless the certification notes differences in method). MU *does not take into account* individual laboratory bias and also excludes results from laboratories who were considered to be outliers.

The MU reported for this reference material does not take into account the effects due to transport. Consequently adequate mixing in the container before use is recommended.

The long term stability of this product under recommended storage conditions is monitored.

Number of ISO/IEC 17025 Accredited Laboratories – is the number of participating round robin laboratories who hold ISO/IEC 17025 accreditation for the required analytical technique, and who returned data that was included in the calculation of the CV and all subsequent statistics.

Homogeneity Testing

Homogeneity testing forms the initial acceptance for the suitability of each batch of KLEN CRM's. The sampling program has been designed by an independent statistician and is followed as part of KLEN's internal quality control procedures. The analytical data returned from homogeneity testing is statistically analysed to confirm suitability for advancement of the batch to the round robin stage of testing at multiple laboratories.

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Homogeneity Test Results

Analyte/s of interest	Au	Pt	Pd
Number of samples tested	30	30	30
Duplicate assays performed on each sample	Yes	Yes	Yes
Number of outlying results rejected	Nil	Nil	Nil
Mean g/t (ppm)	0.517	0.410	0.400
Relative standard deviation %	2.3	3.3	3.6

Metrological Compliance

To ensure metrological traceability to the SI unit kilogram through an unbroken chain of comparisons all having stated uncertainties, only data generated by ISO/IEC 17025 accredited laboratories is used in the calculation of certified value/s.

Additional Statistical Data

Analyte	Standard Deviation g/t	Relative Standard Deviation %	95% Measurement Confidence Interval g/t
Gold	0.015	2.8	$0.518 \pm 2 * 0.009$
Platinum	0.025	5.4	$0.459 \pm 2 * 0.015$
Palladium	0.027	5.7	$0.466 \pm 2 * 0.014$

Notes related to information contained in the Additional Statistical Data Table

Standard Deviation – the Standard Deviation is the standard deviation of the laboratory means provided by the participating ISO/IEC 17025 accredited round robin laboratories, excluding any outlying results.

Relative Standard Deviation – the Relative Standard Deviation is the Standard Deviation value divided by the CV

95% Measurement Confidence Interval - is the CV ± 2*MU based on the accepted data provided by the participating ISO/IEC 17025 accredited round robin laboratories. An unbiased laboratory, using the same analytical method and instrumentation, should able to achieve a result within the quoted interval 95% of the time. It *is not* an indication of the control limits or variability that any given laboratory may choose to impose, or achieve, for their own testing and unique situation. The 95% Confidence Interval excludes any outlying laboratory results.

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Compliance with ISO Standards & Guides

KLEN manufacture all CRM's in accordance with the following ISO Standards & Guides;

- ISO 17034:2016 General requirements for the competence of reference material producers
- ISO Guide 31-2015 Reference materials - Contents of certificates labels and accompanying documentation
- ISO Guide 35-2006 Reference materials - General and statistical principles for certification

Round Robin Laboratories

Samples of batch 74421 were taken in accordance with the sampling plan and placed in heat sealed foil sachets. Each sachet contained sufficient sample to allow duplicate assays to be performed. The samples were distributed to 23 participating laboratories for round robin analysis.

17 laboratories returned Gold results, 15 returned Platinum results and 15 returned Palladium results within the specified time period. Data from laboratories not accredited to ISO 17025 was excluded from statistical treatment.

After analysis of the results, Gold data from three laboratories, and Platinum data from one laboratory was removed as a statistical outliers.

Laboratories were requested to perform fire assay analysis using 50 gram sample weights with each laboratory's routine instrument finish.

Minimum Sample Size

The majority of laboratories utilised 50 gram sample weights for Gold, Platinum and Palladium analyses as requested. Non-outlying data from laboratories that used 30gram sample weights for Gold has been included in the statistical analysis..

While lower sample weights may be employed, the certified value and its associated uncertainty are not guaranteed where less than the following sample weights are used:

- Gold (non-gravimetric) 50 grams
- Platinum 50 grams
- Palladium 50 grams

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Company	Location		Country
❖ Activation Labs (Ancaster)	Ancaster	Ontario	Canada
❖ Activation Labs (Coquimbo)	Coquimbo		Chile
❖ Activation Labs (Kamloops)	Kamloops	BC	Canada
❖ Activation Labs (Thunder Bay)	Thunder Bay	Ontario	Canada
❖ ALS Chemex	Bocanegra Callao	Lima	Peru
❖ ALS Geochemistry (Loughrea)/OMAC	Loughrea	Galway	Ireland
❖ ALS Geochemistry (Malaga)	Malaga	WA	Australia
❖ ALS Geochemistry (Vancouver)	North Vancouver	BC	Canada
❖ ALS Minerals Division Prescott	Prescot		United Kingdom
❖ Argetest		Ankara	Turkey
Bourlamaque Assay Laboratories	Val-d'Or	Quebec	Canada
❖ Bureau Veritas (Acme Analytical Labs)	Vancouver	BC	Canada
❖ Bureau Veritas Inspectorate (Mexico)	Hermosillo	SON	Mexico
Independent Assay Laboratories	Wangara	WA	Australia
Bureau Veritas Inspectorate America Corporation	Sparks	NV	USA
❖ Intertek Minerals (Adelaide)	Wingfield	SA	Australia
❖ Intertek Minerals (Maddington)	Maddington	WA	Australia
❖ Intertek Minerals (Townsville)	Bohle	Queensland	Australia
Kappes, Cassiday & Associates	Reno	Nevada	USA
❖ Mineral Assay & Services Co	Bangprow-Srisatien Road	Raikhing	Thailand
❖ PT Intertek Utama Services	Pekayon, Pasar Rebo	Jakarta Timur	Indonesia
❖ Set Point Laboratories			South Africa
❖ SGS (Assayers Canada) Vancouver	Vancouver	BC	Canada
❖ SGS Australia (Perth)	Newburn	Western Australia	Australia
❖ SGS Mineral Services Burnaby		Ontario	Canada
❖ Standard and Reference Laboratory	Malaga	Western Australia	Australia
TSL Laboratories	Saskatoon	Saskatchewan	Canada
Blue Coast Group Ltd	Parksville	BC	Canada

❖ Indicates laboratory having ISO/IEC 17025 accreditation

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General Product Description

KLEN CRM's are manufactured from blended raw materials to provide a suitable substrate for the analytes of interest. Substrates will vary to provide a background matrix as may be required or suited for particular applications. Starting materials are oven dried for a minimum of 24 hours to remove any moisture. Dried material is then milled and screened to ensure no oversize particles or product agglomerations are present. Required analytes are treated in a similar fashion to ensure they match the particle size of the substrate and can be uniformly distributed throughout the batch.

Instructions for Storage Handling and Use

KLEN CRM's are provided in hermetically sealed jars or sachets. Unopened containers should be stored in a cool dry place. Jar contents should be mixed thoroughly on opening before use. Once jars are opened, the contents can be protected by resealing the inner packaging using the bag clip provided, prior to securely replacing the lid on the container. After opening, jars should be stored in a cool dry place. Sachets are designed for immediate use once opened.

Safety Data Sheet (SDS)

The SDS for the product is available on line from the KLEN website at www.klen.com.au
Direct access is provided via the QR code below.

Path name:
http://www.klen.com.au/CRM/Certificates_of_Analysis/SDS_21003211_Oxide.pdf

Product Certification

Batch 74421 was packed into 500 jars and samples were taken in accordance with a random sampling plan as developed by external statisticians. Four samples were then sent to each of 30 participating laboratories for analysis in duplicate. Samples were analysed using fire assay with the instrument finish being left to each laboratory.

Use of Certified Data

The certified value/s provided within this document are entirely reliant on the data returned from the participating testing laboratories. Analysis of the data is conducted by a third party statistical service who acts independent of KLEN International (74) P/L. Determining the suitability of this product shall be the sole responsibility of the user and application of information contained within this document is at the sole discretion of the user. Through receipt and application of the information contained herein, the user

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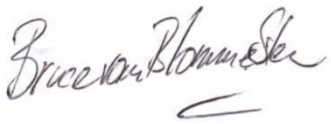
indemnifies and releases both KLEN International (74) P/L and the Centre of Applied Statistics, University of Western Australia from any claim arising from use, application, and any subsequent actions related to the certified data. No warranty either expressed or implied other than the fitness for sale to the above specification is made.

Independent Statistical Analysis

All raw and unaltered data returned from participating round robin laboratories is made available simultaneously to KLEN International (74) P/L and an independent statistical service. Once data returns are complete, analysis is conducted by the independent statistical service and all critical statistical figures are finalised. Statistical data from the final independent analysis are utilised in this report.

Statistical & Administrative Certifications

We the undersigned verify that the information contained within this certificate is a true and accurate representation of the product described herein.



Dr Alethea Rea BSc (Hons) PhD
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University of Western Australia

Mr B. van Blommestein MRACI C CHEM(A)
Chemist
KLEN International (74) Pty Ltd

Revision Information

ver 1.1	Revision Date :	May 2018
	Revision Summary:	Correction of non-conformances regarding content of Certificates of Analysis identified during ISO 17034 accreditation audit.
ver 1.2	Revision Date :	June 2018
	Revision Summary:	Recalculation of Certified Values and associated statistics due to previous inclusion of data from one laboratory unable to substantiate ISO 17025 accreditation.

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SUPPORTING PRODUCT INFORMATION

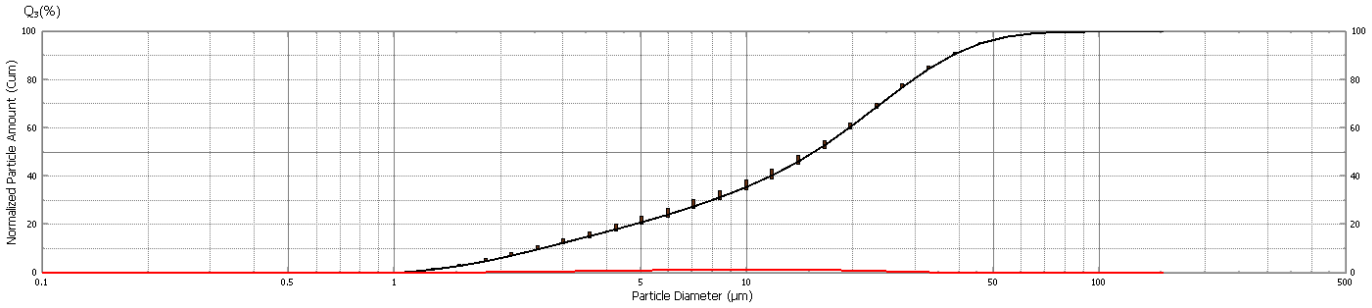
NB: Information provided from this point forward is given as supporting data/information and is not intended to provide metrological traceability or compliance with ISO 17034 reporting requirements.

Particle Size

Particle size analysis was performed on 5 samples of SKU 21003211, batch number 74421, using a Shimadzu SALD-2300 laser diffraction particle sizer with SALD-DS5 dry injection, sample introduction unit.

The averaged results for 5 samples provided the following data;

Median particle diameter (micron)	16
Modal particle diameter (micron)	24
Mean particle size (micron)	12
Standard deviation of Mean (%)	0.43
Particle size for cumulative 90% of product (micron)	39



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Product Description

SKU 21003211 batch number 74421 is a dry and uniform powder with a light grey colour.
Typical chemical composition determined by XRF analysis is as follows;

Content	%
SiO2	63.0
Al2O3	17.0
CaO	3.5
Fe	3.0
K2O	4.0
MgO	1.8
Na2O	5.0
P	0.1
S	< 0.02
TiO2	0.6
Cl	< 0.01
Moist	< 0.5
LOI	< 0.5

Typical Geological Analysis

X-Ray diffraction analysis provided the following crystalline and amorphous content information.

Phase	Formula	wt %
Amorphous content		<15
Augite	(Ca,Na)(Mg,Fe,Al,Ti)(Si,Al)2O6	30 - 40
Fayalite	Fe2SiO4	<5
Ilmenite	FeTiO3	<5
Magnetite	Fe3O4	<5
Pyrite	FeS2	<1
Quartz	SiO2	<1
Sodium Calcium Plagioclase	(Na,Ca)(Al,Si)2Si2O8	40 -50

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