HIGH QUALITY CHEMICAL DETERMINATION ON AUTOMOTIVE CATALYSTS

RELIABLE CHEMICAL DATA SAVES MONEY

Whether you are buying or selling, small variations in "measured" amounts of platinum, palladium and rhodium can have a large impact financially.

QUANTIFY "RELIABLE"

ISO-standard procedures objectively monitor precision, accuracy and relative standard deviation using reference materials and duplicate samples. SGS Minerals Services routinely analyses catalyst materials and provides high precision data with RSDs between 0.7-1.5% (1 sigma). Accuracies typically exceed 1%.

WHY SGS?

The SGS lab in Lakefield has been producing bankable data for the metals
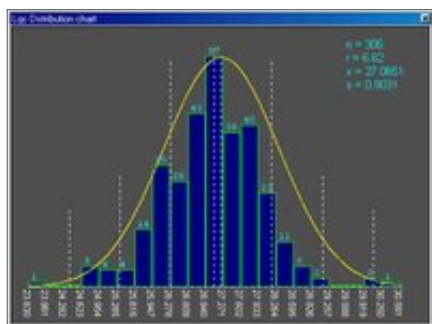
and metallurgy industry for over 60 years. Since 1994, we have successfully conformed to the requirements of a number of ISO/IEC or 17025 standards for over 110 specific registered tests. Independence, impartiality and expertise are the tenets of our business.

CATALYST ANALYSIS

- PGE - Fire assay followed by various instrumental techniques (inductively coupled plasma - atomic emission.
- ICP-mass spec or atomic absorption). Ce, La, Ba, Ni, Zr and Al - Borate fusion – X-Ray fluorescence spectrometry (XRF).

PLATINUM, PALLADIUM

SGS

AND RHODIUM

FIRE ASSAY- ICP-OES, - ICP-MS OR - AA

Fire-assay – ICP-OES is an industry standard method for determining Pt, Pd and Rh. The sample is ground, subsampled and fused in a NiS button. A second button scavenged from the slag is also analyzed to ensure full recovery. The buttons are pulverized and dissolved in acid and the PGE-bearing residue filtered. This residue is dissolved and measured by ICP-OES, ICP-MS spec or atomic absorption.
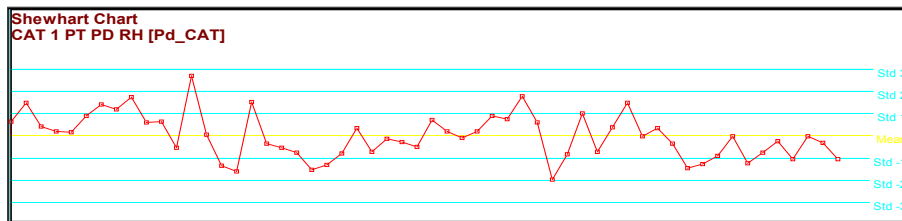
PRECISION

Reputable labs analyze control materials to monitor their performance. Ideally, such reference materials will span both the concentration range and the expected sample types.

The control charts on the right show the high precision that the SGS laboratory in Lakefield routinely achieves on PGE in catalysts. RSD are tight (1 sigma 0.7-1.4% on 13 data-sets from 50 to 12000 ppm). Data for the other PGE are available for each material on request.
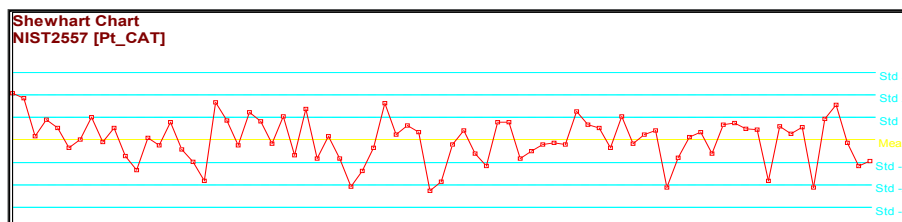
ACCURACY / BIAS

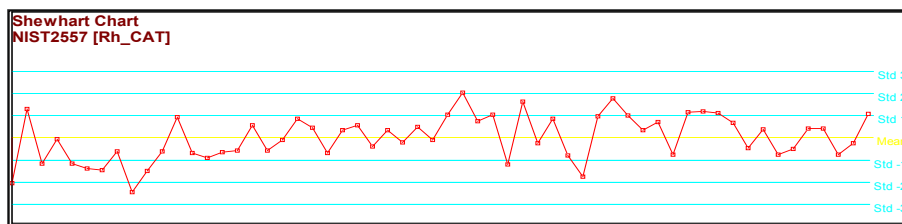PGE determinations on certified reference materials show no bias at the 95% confidence level.

Shewhart Chart
CAT 1 PT PD RH [Pd_CAT]

April 01   *May 02*

Shewhart Chart
NIST2557 [Pt_CAT]

Jan 00   *May 02*

Shewhart Chart
NIST2557 [Rh_CAT]

Jan 00   *May 02*

SUMMARY

SGS generates high quality analytical data on catalysts. Proof we deliver…our detailed statistical databases for PGE and other critical elements.

REFERENCE MATERIAL	ELEMENT	POINTS	MEAN (G/T)	SD (1)	ACCEPTED VALUE (G/T)	DIFFERENT AT 95% CI?
NIST-2557	Pt	80	1134	12	1131	No
NIST-2557	Rh	58	135	1.7	135	No
NIST-2557	Pd	33	232	3.2	233	No

These data are drawn from single measurements. For increased confidence, normal practice at the SGS laboratory in Lakefield is to perform catalyst determinations in triplicate.

# RARE EARTH ELEMENT, BASE METAL AND COMPONENT OXIDES

BORATE FUSION – X-RAY FLUORESCENCE SPECTROMETRY (XRF)

The sample is pre-dried to a specified temperature and sampled. It is added to 7g of Li tetraborate /metaborate flux and fused, then cast and cooled. Measurement is by XRF. Loss on ignition is determined separately by roasting 1g of sample for 1 hour to correct for fusion losses.

PRECISION

Reputable labs analyze control materials to monitor their performance. Ideally, such reference materials will span both the concentration range and the expected sample types.

These control charts show the high precision that SGS lab in Lakefield routinely achieves on catalyst materials. RSD are tight (1 sigma 1.0-3.4% on 16 data-sets).   Typical data for other elements is tabulated below. Complete data-set available on request.

Shewhart Chart
IGS 41 XRF [Ce2O3XRF]

Mar 96   *May 02*

Shewhart Chart
IGS 40 XRF [BaOXRF]
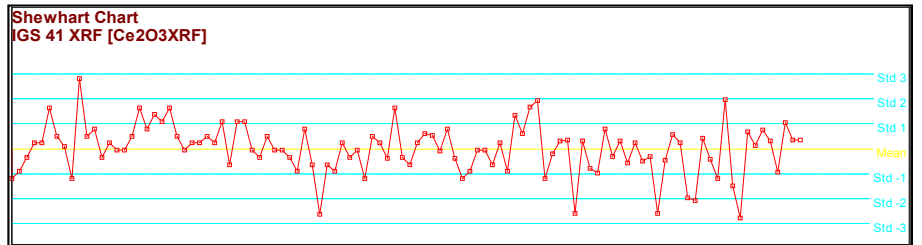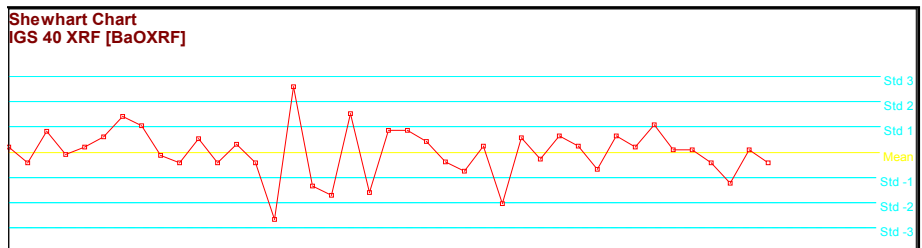
Dec 98   *May 02*

REFERENCE MATERIAL	ELEMENT	POINTS	MEAN (WT.%)	SD (1)	REL DEV (1)	ACCEPTED VALUE (WT.%)	DIFFERENT AT 95% CI?
IGS 41	Ce_2O_3	106	30.6	0.4	1.1%	30.7	No
IGS 41	La_2O_3	104	20.8	0.2	1.1%	20.9	No
IGS 40	BaO	51	13.5	0.4	2.9%	13.5	No
SARM-6	NiO	28	0.26	0.01	3.1%	0.26	No
In-house Cat 2	ZrO_2	14	14.1	0.2	1.1%		

These data are drawn from single measurements. For increased confidence, our normal practice is to perform catalyst determinations in triplicate.

ACCURACY / BIAS

SGS Minerals Services' oxide determinations on certified reference materials (tabulated above) show no bias at the 95% confidence level.

SUMMARY

We generate high quality analytical data on catalysts. Proof we deliver…our detailed statistical databases for PGE and other critical elements.

If small variations in your analytical determinations impact critically on your financial performance, consider partnering with SGS.

CONTACT INFORMATION

Email us at minerals@sgs.com
www.sgs.com/mining

WHEN YOU NEED TO BE SURE

SGS