

Car Catalytic Converters Recycling

Pt, Pd and Rh Analysis with Portable XRF

The portable DELTA X-ray Fluorescence analyzer provides a high level of performance when measuring metals such as Pt (Platinum), Pd (Palladium), and Rh (Rhodium) in catalytic converters. All new cars today are equipped with catalytic converters for significant reduction of harmful emissions such as carbon monoxide (CO), hydrocarbons (HC) and nitrogen oxides (NOx).

Certain chemical reactions in an automotive catalytic converter transfer the harmful substances into carbon dioxide (CO₂), water (H₂O) and nitrogen (N). To optimize and speed up these reactions, catalyst elements such as the three platinum group metals (PGM) Platinum (Pt), Palladium (Pd) and Rhodium (Rh) are used in the converters.



DELTA handheld X-ray Fluorescence (XRF) analyzers provide convenient, easy, on-the-spot measurements of automotive catalysts with

- high precision and accuracy within 1 - 2 minutes
- excellent analytical performance close to the wet chemistry results

Benefits:

- rapid identification of worthless monoliths (unloaded or washed-out)
- rapid sorting of catalysts converters of different value levels for the recovery of the precious metals Pt, Rh and Pd
- precise PGM concentration in minutes for price calculation

The DELTA XRF analyzer also provides high quality results for additional catalyst metals such as Ti, Cr, Mn, Fe, Ni, Cu, Zn, Pb, Bi, Sr, Zr, W, Se and Ce.

Every new vehicle is outfitted with a new type of catalyst. Consequently, each year several hundred different types of catalysts are produced resulting in a great variation in the PGM loadings.

Recycling of Automotive catalysts for the recovery of Pt, Pd and Rh helps saving the natural resources, reduces costs required for traditional mining techniques and saves the environment. Catalytic converter scrap also has a much higher content of Pt, Pd and Rh than ores.

The recoveries of Pt, Pd and Rh from used automotive catalysts will also satisfy the demand for the new production. The proportion of recycled PGM in the production of new catalyst converters is constantly increasing.

Hundreds of users all over the world – from collector to refiner – have confidence in the reliability of the DELTA

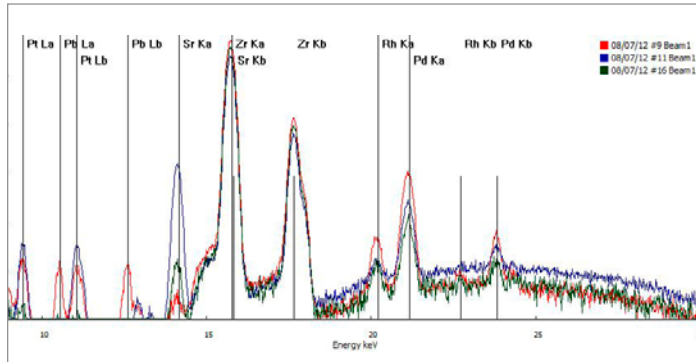
handheld XRF analyzer to monitor incoming or outgoing materials. With 40 - 60 thousand different types of catalytic converters on the market identifying and calculating its value only by part numbers or shapes is not practical. Therefore fast and reliable analytical methods for accurate analysis are critical for the daily business for QC, sorting, and price evaluation for buying and selling.

Washcoat	Conc. in wt%
Pt	0 – 1.3
Pd	0 – 2.5
Rh	0 – 0.15

Typical concentration of the Platinum group metals in ceramic based car catalyst converters.

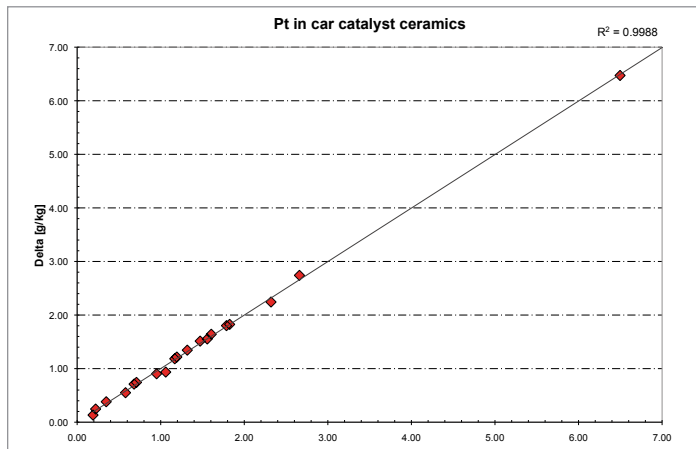
Olympus XRF Analyzers – Performance You Can Count On

While benefiting from the convenience of easy, on-the-spot analysis with an Olympus Handheld XRF, you can be confident in results that will help assure maximum profit of fast sorting of the material.



Typical XRF Spectra of Automotive Catalytic Converter elements.

Our unique hardware and software combination allows us to create specific calibration models for compensating side effects caused by the complex chemistry and varying concentration of the other elements in the washcoat like Zr, Sr, Ba, and Ce but also pollutants like Pb and other elements like W and Se in the ceramic substrate.



Correlation curve from measurement of CC samples with known Pt content

In addition to Pt, Rh and Pd, the DELTA analyzer provides a high level of performance for other metals of interest. The OIX XRF analyzers detect also Ti, Cr, Mn, Fe, Ni, Cu, Zn, Pb, Bi, Sr, Zr, W, Se and Ce.

Sample	Pt % Lab	XRF Analyzer
CC 3	0.119	0.119
CC 7	0.095	0.095
CC 8	0.058	0.054
CC 9	0.156	0.156
CC 10	0.161	0.163
CC 14	0.035	0.040

Sample:	Pd % Lab	XRF Analyzer
CC 3	0.057	0.051
CC 7	0.061	0.057
CC 8	0.080	0.077
CC 9	0.065	0.062
CC 10	0.057	0.056
CC 14	0.018	0.018

Sample:	Rh % Lab	XRF Analyzer
CC 3	0.018	0.018
CC 7	0.022	0.023
CC 8	0.024	0.022
CC 9	0.018	0.018
CC 10	0.012	0.012
CC 14	0.008	0.009



DELTA Portable Workstation with integrated safety-lock shielding for powdered or small objects; a PC is connected for remote control of this closed-beam DELTA set-up.

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OLYMPUS

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