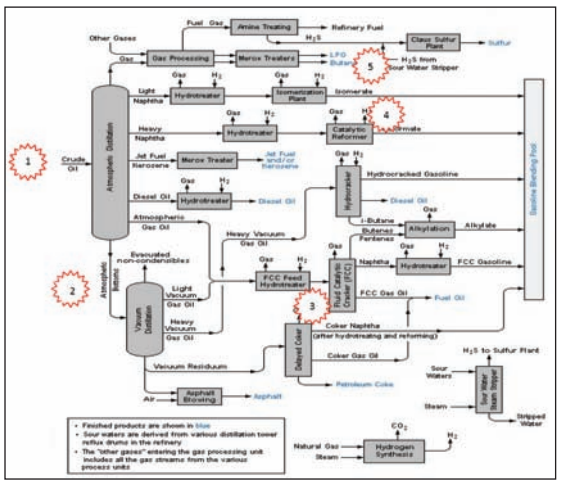
Analysis of Metals in Refinery Streams Using WDXRF



Ref No.	Area	Analysis
1	Crude Oil Desalters	Na, Ca, S, Ni, V, Fe, Cu, Zn, Bi, Pb, Hg and others
2	Atmospheric Bottoms	Al, Si, Na, Ca, P
3	FCC	Metals on Spent and Regenerated Catalyst
4	Reformate	Low Level Sulphur
5	Sour Water Stripper	Cl

Figure 1: Refinery Diagram and Metals Analysis (Wikipedia)

Metal contaminants in crude oil are common place and often tell the diagensis of the oil released to the earth's surface. In addition to sulphur, metals such as V, Ni and Fe are indicative of the crude oil's origins.

Modern refinery processes are sensitive to these metals. In sufficient concentrations they significantly lower the yields of desired products during reaction cycles, and may even poison the catalysts used in these reactions.

Part of the refining process is dedicated to removing these metals from the process streams in order to minimise unwanted side effects. Process control limits exist to maximise refinery process yields and tocontain costs by maximising expensive catalysts lifetimes. Units have a catalyst regeneration cycle need to quantify their effectiveness. Part of the process optimisation requires vigilant analysis of metals in all parts of the refinery streams to meet these process goals.

Element	Al	Si	P	S	Ca	Ti	V
Std. value	0.050	0.050	0.050		0.050	0.050	0.050
SQX Scatter FP	0.0632	0.0457	0.0488	1.25	0.0535	0.0535	0.0524
FP (H_2O) balance	0.132	0.0976	0.107	2.75	0.0317	0.119	0.0120
Element	Cr	Mn	Fe	Ni	Cu	Zn	Sr
Std. Value	0.050	0.050	0.050	0.050	0.050	0.050	-
SQX Scatter FP	0.0501	0.0531	0.0537	0.0532	0.0507	0.0485	0.0017
FP (H_2O balance)	0.132	0.123	0.124	0.123	0.117	0.112	0.0034
Element	Mo	Cd	Sn	Ba	Pb		
Std. Value	0.050	0.050	0.050	0.050	0.050		
SQX Scatter FP	0.0418	0.0444	0.0443	0.0474	0.0463		
FP (H_2O balance)	0.0721	0.0593	0.0567	0.108	0.0971		

Table 1: Standardless Scatter FP results vs Conventional FP results for Conostan S-21 500ppm

WDXRF is uniquely suited to be used in these multiple analytical needs, since the steps to prepare samples for analysis are straightforward and relatively quick. The methods can be extremely sensitive, with limits of detection for most metals being of the order of 0.2 - 1.0 ppm, thus allowing quantification of all metals down to 1 - 3ppm.

Rigaku's ZSX Petro series spectrometers offer both 3 kW and 4 kW options. The Rigaku ultra-thin X-ray tube window allows superior performance for the light elem ents Na, Mg, Al, Si, P, S, Cl, K and Ca, all of which play a crucial role in refinery processes performance. Coupled with the Rigaku Scatter FP software, the ZSX Petro spectrometers are uniquely suited to provide accurate standardless analysis for a large number of m etal contaminants in a variety of organic matrices. The Scatter FP program accurately models the unmeasured portion of the material being analysed and uses this model in the final refinements of the calculations. The improvement in accuracy utilising this Rigaku software feature over conventional semi-quant programs used in the industry can be as large as 95%.

If better control over the level of refinery metals is a goal of your process refinement, then contact us for a demonstration of this unique approach and let us show you how we can improve your process control. For more information contact info@rigaku.com, visit our website at www.rigaku.com/xrf/petroleum.html or call us at +1-281-362-2300 and leave a message at x260. Visit us at the Gulf Coast Conference (GCC), bo oth #904.

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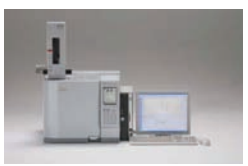
New Fast GC for Trace-Level Analysis with High Sample Throughput



Shimadzu (Germany) presents its new GC-2010 Plus. The GC-2010 Plus now features new aspects in High-End-Technology. Featuring the specially designed AFT (Advanced Flow Technology), the GC-2010 Plus combines highest separation efficiency with increased productivity and reduced analysis time.

Advanced Flow Technology is based on four systems to further enhance efficiency and productivity of a GC: In Multidimensional GC (MDGC) two capillary columns with different separation mechanisms are coupled. MDGC systems separate and quantitate compounds in difficult matrices e.g. petrochemical (e.g. oxygenates in petrol) or food samples (e.g. aroma compounds); When the target compounds have eluted from the column, the back flush system reduces analysis time by reversing the flow of the carrier gas and flushing high boiling point compounds back through the split vent; and To transfer the effluent from the column to two different detectors (e.g. FID and EDC) the detector splitting system is applied. A mass spectrometer can also be used as second detector. In the detector switching system different detectors can be selected easily.

Free-of-charge Advanced Flow Technology Software controls all parts of the AFT in combination with GCsolution and GCMSsolution software.

Compressing processes and saving time are important goals for an analytical laboratory. Total analysis time determines the sample throughput that can be achieved. Fast GC with narrow bore columns as well as the possibility to operate two analytical flow lines in one GC independently of each other decreases the total analysis time. Additionally, the GC-2010 Plus features an improved oven cooling using a double-jet cooling system to increase the dynamic heat flow to the environment.

In food safety or in the detection of poisonous substances a lower threshold value often does not exist. Trace-level amounts, therefore, need to be detected unambiguously and with high precision. The GC-2010 Plus detects and identifies trace-level amounts through its new family of best-in-class detectors utilising the latest technology (e.g. FID and FPD) with world-leading sensitivity.