SPECTRO REPORT

Application Sheet 89
SPECTROFLAME-ICP

Wear metals in used engine oils

Introduction

Periodic engine oil analysis is used to determine which engine components are waring and if the level of wear is nearing a critical point: drain intervals are extended and engine life prolonged.

Application

The detection limits for Al, Cd, Cr, Cu, Fe, Mg, Mn, Mo, Na, Ni, P, Pb, Si, Sn, Ti and V are measured with ICP-OES after dilution with kerosene.

Instrumentation

All measurements are obtained using a SPECTROFLAME equipped with an ICP 27 MHz free running soruce unit. The selected operating conditions are listed in Table 1.

Table 1 - Operating conditions

Power	1.2 kW
Gas flows	
• cooling	15 l/min
• auxiliary	1.5 l/min
Torch	
• fixed	
• Injector tube 2 mm	
Nebulizer	
• type	cross-flow
• pressure	3 bar
• carrier	0.8 l/min
• uptake rate	1.5 ml/min

Sample preparation

Dilution 1:9 reduces viscosity effects between the different oils samples and allows an efficient introduction.

Results

Calibration lines are established for each element using Conostan S21. Regression analysis is carried out to avaluate the detection limits.

Results are shown in Table 2.

Table 2 - Line selection and detection limit

Element	Wavelength (nm)	Detection limit µg/g in oil
Al	308.21	0.1
Cd	226.50	0.04
Cr	267.72	0.09
Cu	324.75	0.1
Fe	259.94	0.07
Mg	279.55	0.003
Mn	257.61	0.01
Mo	281.61	0.2
Na	588.99	2.2
Ni	231.60	0.2
Pb	220.35	0.4
Si	251.61	0.3
Sn	189.99	0.4
Ti	337.27	0.06
V	311.07	0.09

■

SPECTRO Analytical Instruments GmbH • Boschstr. 10 • D-47533 Kleve • Tel. (0)2821/892-0 • Fax 02821/23144 • Telex 811734 sptro d • http://www.topbusiness.com/spectro/