Detailed analysis of lubricant deterioration using multiple analyzers

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1. Introduction

Engine oil deterioration is significant in the evaluation for engine performance, cost and environmental factors. FT-IR and GC analyses are powerful tools for evaluating changes in engine lubricant. FT-IR analyzes the chemical state of the oil while GC is used to determine the chemical composition of the oil. Together, these methods provide a comprehensive analysis of the oil's condition.

2. Lubricant deterioration analysis using compact FT-IR

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3. Rapid analysis of fuel dilution of lubricants by GC

The chromatograms of gasoline dilution of lubricants are shown in Figure 3. The gasoline dilution of lubricants is analyzed using GC-2030 and backflush system. The sample is analyzed by placing it in a CS2 blank after sample backflush. The reproducibility %RSD of diesel dilution is shown in Table 4.


Table 6 shows the analytical results. Recoveries near 100% were obtained in the dilution test for the high-concentration elements and the spike-and-recovery test for the low-concentration elements. The analytical results obtained in analysis of the unused lubricants are also listed for reference.

5. Conclusions

In conclusion, the use of FT-IR and GC for lubricant analysis is highly effective. FT-IR analysis provides detailed information on the chemical state of the oil, while GC analysis provides information on the chemical composition of the oil. Together, these methods provide a comprehensive analysis of the oil's condition. ICP-AES analysis is also effective for determining the presence of wear metals and contaminants in used lubricants.