Abstract

Tribology International, **65**, 37-47 (2013)

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Comparison of engine oil degradation observed in laboratory alteration and in the engine by chemometric data evaluation.

The influence of ethanol in gasoline and its partial combustion products on the engine oil performance was investigated by joint use of IR spectroscopic data and chemometrics. Oil samples obtained from artificial alteration in the laboratory and engine alteration in a chassis dynamometer were compared.

Quantification of residual amounts of antioxidant and antiwear additive (ZDDP) in the oil samples by FTIR spectroscopy showed depletion of phenolic antioxidant during engine alteration but ZDDP degradation during artificial alteration.

Different chemometrical models using principal component analysis (PCA) elucidated similarities and differences between both alteration types, proving the findings of FTIR spectroscopy. Additionally, laboratory-based artificial alteration was mainly driven by oxidative processes whereas engine alteration showed higher amounts of both oxidation and nitration products.