

Abstract

In Bartz W.J. (ed.), *Proceedings of the 16th International Colloquium Tribology*, Technical Academy Esslingen, ISBN 3-924813-73-6, 15. - 17. 1. 2008, Stuttgart/Ostfildern, Germany (2008)

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Implementation of chemometrics in oil condition monitoring - trend analysis illustrated by gas engine oils

(Total) acid number (TAN or AN) is considered as important indicator of oil quality, specifically in terms of defining oil oxidation and the extent of acidic contaminations in used oils collected from two engines running each with a different biogas.

This paper presents the results of mathematical models based on chemometrics comprising principal component analysis (PCA) for qualitative evaluation and partial least squares regression (PLS) for quantitative evaluation of used gas engine oils, respectively. These investigations are based on infrared spectrometry and (total) acid number measurements of monograde mineral oil based gas engine oils SAE 40.

It is reported how IR spectrometry and chemometrics can be used for the illustration of the influence of gas fuel type on oil ageing (PCA) and for the indirect determination of acid number (PLS). In contrast to the conventional time-consuming AN determination according to ASTM D 664 (about 30 minutes each sample), the joint use of IR spectrometry and chemometrics offer results after some minutes. The chemometric "measurement error" is in the range of precision and bias of the standard method.