

APPLICATION SHEET

Organics – Automotive

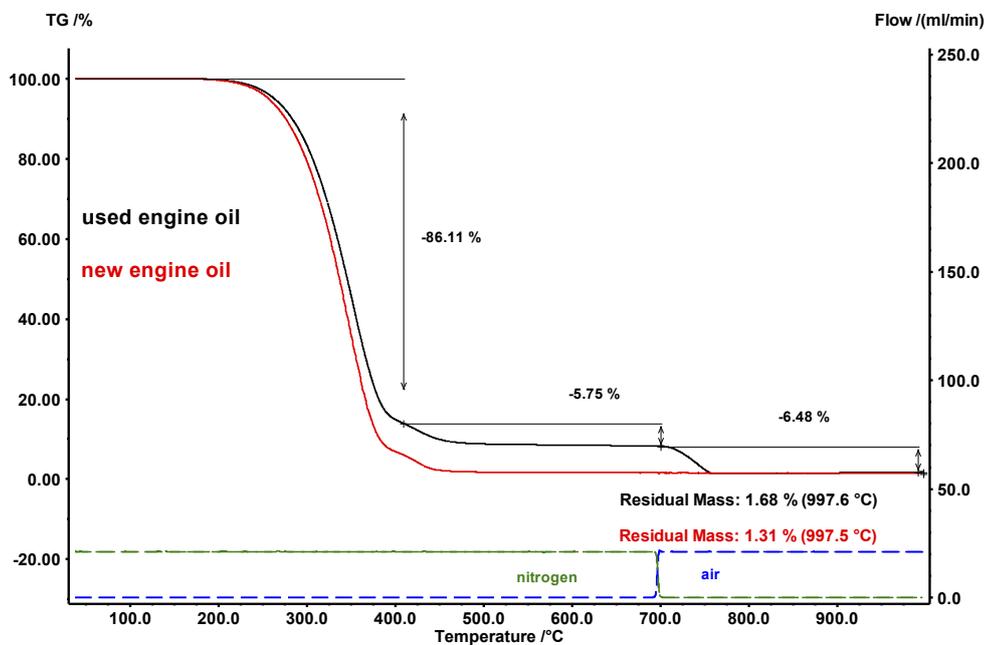
TG 209 F1 Iris®

Engine Oil

Introduction

Motor oil is used as a lubricant in various kinds of internal combustion engines in automobiles and other vehicles, boats, lawn mowers, trains, airplanes, etc. In engines, there are contacting parts which move against each other at high speeds, often for prolonged periods of time. Such rubbing motion causes friction, absorbing otherwise useful power produced by the motor and converting the energy

to useless heat. Lubricating oil makes a film between surfaces of parts moving against each other so as to minimize direct contact between them decreasing friction, wear, and production of excessive heat. Also motor oil carries away heat from moving parts. During usage, engine oil is contaminated with particles. Thermal treatment is also a reason for aging of the oil. In order to avoid engine failure, the oil must be changed when losing its performance.



Test Conditions

Temperature range: RT ... 1000°C
Heating/cooling rates: 20 K/min
Atmosphere to 550°C: Nitrogen at 20 ml/min to 700°C
Sample mass: 10.14 mg and 11.56 mg
Crucible: A₂O₃
Atmosphere: Air to 1000°C

Test Results

The soot content of engine oil is a good indicator of the maintenance interval. The main decomposition step between 200 and 450°C is related to the pyrolysis of the oil. At 700°C, the purge gas is changed from nitrogen to air. If carbon is present, it reacts with oxygen and forms CO₂. The carbon dioxide release can be determined as a mass-loss step. The figure shows no carbon content for the new oil whereas the used oil contains 6.5% soot. For soot determination, optical methods were formerly used. However, other particles from metal abrasion for instance often disturb these analyses or increase the uncertainty.