



Influence of bio-fuels on passenger car vehicle emissions

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In order to reduce the emissions of air pollutants, vehicles design and fuel formulation have changed. Ultra clean vehicle technologies started to be used in increased number. As a result, the emissions composition is expected to change as well. The use of new technologies and new fuels require new emissions tests especially for non-regulated compounds. The interest in using bio fuels as alternative fuels for petroleum-based ones has increased constantly in the last years. The advantages of the bio fuels usage is given by their similar proprieties, characteristics of renew ability, biodegradability and potential beneficial effects on the exhaust emission. The study involved measurements on a roller test facility of a reference passenger car representing new technologies (emission standards, injection system). The vehicle operated by use of reference gasoline and reference gasoline blended (10 and 20%) with bio-ethanol (EtOH). The measurements used different driving cycles: ARTEMIS cycle, real world driving cycle, NEDC cycle, the standard European driving cycle and additionally, a driving cycle consisting in Idle, 30, 50, 90 km/h. The sampling positions were before and after the catalyst and in the exhaust pipe. The detailed speciation of NMVOC' (non methane volatile organic compounds) was completed by use of active carbon tubes, DNPH (2,4-dinitrophenylhydrazine) tubes and cold traps. The particles were monitored by use of an on-line EEPS (Engine Exhaust Particle Sizer). CO₂, NO, NO₂ and NO_X (NO +NO₂) were continuously monitored by use of an on- line FTIR (Fourier transform infrared spectroscopy)- MEXA system. The investigations reveal that among the carbonylic compounds 15 oxygenated species were found in engine out exhaust and only 3 in tailpipe emissions, namely formaldehyde, acetaldehyde and acroleine. These are of great interest due to their impacts on human health. The hydrocarbons emissions decrease by increased of EtOH content. New compounds were observed. The nitro-compounds found in the after engine position by increased EtOH were no more found in the exhaust gas. The results show that total particle concentration, mass and diameter decreased substantially after catalyst and filter by increased ethanol blend.