

There is an effort to replace petroleum-based diesel with biodiesel because biodiesel is renewable, and recent research has shown that the levels of some regulated emissions e.g., particulate matter (PM), CO, and SO₂ from biodiesel are less than those from petrodiesel. Therefore, there has been an increase in biodiesel production and use in recent years. Some studies have, however, indicated that the unregulated toxic emissions like carbonyls from biodiesel are more compared to those from petrodiesel. Also, there is little information concerning the interaction of biodiesel exhaust PM with atmospheric oxidants such as ozone. The oxidation products of the reactions between ozone and the carbonyls emitted in the biodiesel exhaust could have worse health and environmental impacts than the primary emissions.

An Armfield Limited CM12 Automotive Diesel Engine operated in an aggressive cycle driving mode is used to generate PM from various biodiesel feedstocks (soybean, canola, and animal fat). The PM emissions are sampled by a variety of instruments: - engine exhaust particle sizer, EEPS (TSI, Inc, Model 3090) for measuring particle size distributions between 5.6 and 560 nm in real-time; electrical low pressure impactor, Teflon filters for measuring the gravimetric mass, and quartz fiber filters (QFF) for chemical analysis of the exhaust PM. Chemical analysis of the biodiesel exhaust PM is performed using gas chromatography mass spectrometry (GCMS). Recent laboratory experiments have concentrated on developing a method for extracting and analyzing the polar and non-polar compounds in the biodiesel exhaust PM using laboratory standards. In the future, PM sampled with QFF's will be exposed to different ozone concentrations over a 24-hour period at room temperature in order to investigate the products of the reactions between ozone and the carbonyls emitted in biodiesel exhaust PM. Carbonyls, PAHs, and quinones will be the compounds of interest in these experiments.