

AN EXPERIMENTAL AND THEORETICAL INVESTIGATION OF PARAMETERS AFFECTING NANOPARTICLE FORMATION IN DIESEL EXHAUST SAMPLING

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EXTENDED ABSTRACT

Nanoparticle formation during diesel exhaust sampling was studied both theoretically and experimentally. The goal was to investigate the potential for nanoparticle formation after sampling in selected conditions.

Measurements were conducted using a diesel Euro II vehicle and a sampling system designed to maximize the potential for homogeneous nucleation. Sampling was made directly from the tailpipe according to the partial flow method. Parameters experimentally investigated included dilution ratio, dilution air temperature and humidity, and diluted exhaust residence time in the stabilization chamber prior to further dilution and measurement. The measurements showed that nuclei mode depends on a variety of additional parameters such as engine operating conditions, and fuel properties.

In this context, theoretical calculations were made to gain some additional insight into the process. The diesel aerosol was modeled as a gas – vapor – liquid mixture flowing in a chamber. Numerical calculations were performed based on the sampling conditions and the results were compared with measured parameters to obtain qualitative knowledge on the process.

Key words: diesel, nanoparticles, sampling, nucleation, growth