

Chemistry for clean air



Amanda Mahlangu, a master's student in chemistry at the University of Pretoria (UP), won an award for the best student paper presented at the 2019 National Association for Clean Air Conference, held in Stellenbosch in October.

Her presentation was titled 'Characterisation of semi-volatile hydrocarbon emissions from diesel engines', and was based on a study in which she analysed diesel exhaust emissions. The results of the study will contribute to our understanding of ground-level ozone and secondary organic aerosol (SOA) – both being pollutants that affect human health and ecosystems.

"Receiving the award is a great honour as it meant recognition of the hard work that I have put into my project, by professionals with great knowledge in my field and in the scientific community," an elated Mahlangu said about the award. "It motivated me to continue to work hard and strive to grow within my field."

She said while choosing a career path can be very difficult for most young people, it wasn't for her.

"I have always loved chemistry from a young age and was quite good at it in high school, so the choice to do it at a degree level was almost an obvious one. Completing the degree was not an easy task, however winning this award felt like validation that I made the correct decision, and that – despite the challenges – following my passion was the best choice I could have made for myself."

Mahlangu completed a bachelor's degree in biochemistry, majoring in both biochemistry and chemistry, and it was during these years that she developed her passion for research and analytical chemistry. After her undergraduate degree, she went on to complete an honours degree in chemistry in 2017. The following year she started her master's degree, and joined the Environmental Monitoring and Sensing Research Group led by Prof. Patricia Forbes.

Mahlangu also won the Nico Nibbering Travel Award to attend the 4th International Mass Spectrometry School in Spain in 2019, and was awarded a UP postgraduate master's research bursary as well as a Sasol bursary in 2018 and 2019. Her MSc project, co-supervised by Prof. Forbes and Paul Schaberg from Sasol, focuses on characterising exhaust emissions from diesel engines using different fuels.

"I use portable sampling devices called denuders to collect diluted diesel exhaust emissions and analyse them using a thermal desorption-comprehensive 2D gas chromatography-time of flight mass spectrometry instrument, which uses a high-temperature thermal desorber to transfer the collected analytes into the instrument, where they are separated into different chemical classes," she explains. "My aim is to identify and quantify alkyl-benzene and n-alkane hydrocarbons, which are known to play a role in the formation of ground-level ozone, and to determine the ozone formation potential of these compounds."

Mahlangu also investigates whether there are discernible differences in their emission as a result of fuel composition, fuel property, engine operating conditions, and exhaust after-treatment technology.

"The study addresses a major analytical limitation in characterising these emissions, and studies like it are important to help understand the ground-level ozone levels and SOA formation in South Africa," she said.

Issued by Martie Meyer, First Communication Practitioner for the University of Pretoria's Faculty of Natural and Agricultural Sciences.

