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# The Effect of Air-Fuel Ratio on Tailpipe Exhaust Emission Measurement of Motorcars

- Chapter
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## **Advanced Manufacturing in Biological, Petroleum, and Nanotechnology Processing**

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## Abstract

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This research showed the effect of motor cars' air to fuel ratio (AFR) on vehicular emission. It involved the measurement of the actual AFR and the vehicular pollutants from the tailpipe emission of motor cars with petrol engines in Southwest Nigeria. It presents the ratio of actual air-fuel ratio (AFR<sub>actual</sub>) to the ideal/stoichiometric air-fuel ratio (AFR<sub>ideal</sub>) known as the equivalence air-fuel ratio or lambda ( $\lambda$ ). These lambda values were compared with the expected value for lambda given by the catalytic technology for exhaust gas emission,  $1 (\pm 5\%)$ . It was observed from the data that only 39% of the sampled vehicles have their lambda values within the expected value for lambda. It was also observed from the data that most of the lambda values were greater than 1. This indicated rich air to fuel mixtures because the fuel used was more than required for the combustion processes in the internal combustion engine resulting in unburnt hydrocarbon. Kane automotive 4-gas analyser was used for the measurement of vehicular emissions. An ideal air-fuel ratio prevents the emission of high concentration of vehicular pollutants. Pollutants from vehicles, such as carbon monoxide (CO), carbon dioxide (CO<sub>2</sub>) and hydrocarbons (HC), are mostly influenced by air to fuel ratio. With this study, fuel consumption can be monitored to reduce vehicular emissions in Nigeria.

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