Study on emission level of in-use motorcycles fuelled by gasoline, E5 and E10

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Introduction

In some ASEAN countries, motorcycles are the most popular transportation vehicles due to its low cost and flexibility. However, a large number of motorcycles emit a significant amount of emissions that contribute a high share of total emissions from vehicles to the atmosphere, especially in urban areas. Emission level in exhaust gas strongly depends on technology and quality of vehicles as well as fuel use. While these factors change year by year, the investigation of emissions are carried out every few years. In Viet Nam, to reduce emissions and ensure energy security, E5 (5% of ethanol and 95% of fossil gasoline) has been used as commercial fuel together with neat gasoline, and E10 (10% of ethanol and 90% of fossil gasoline) will also be used soon. This paper presents the emission level of the in-use motorcycles including carbureted and fuel injected motorcycles fuelled by neat gasoline, E5 and E10. The tests were done on chassis dynamometer following the ECE R40 driving cycles.

Material and Methods

An in use carbureted motorcycle and an in use fuel injected motorcycle were selected to assess the emission level. The motorcycles were fuelled by neat gasoline, E5 and E10 in turn and tested following ECE R40 driving cycle. Testing facilities comprise a chassis dynamometer 20" (CD 20"), a constant volume sampling (CVS) system, a combustion emission bench (CEBII). Beside the gaseous emissions, particle number in exhaust gas was also counted with the sampling system developed at Internal Combustion Engine, HUST and the DiSCmini counter (Figure 1).

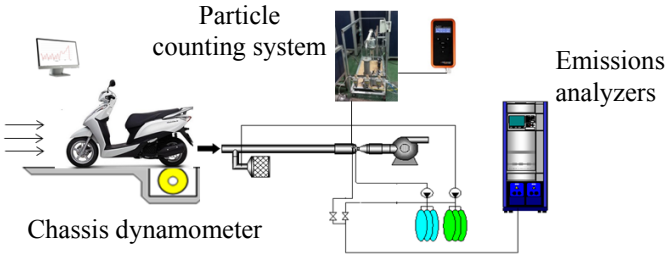

Figure 1. Experimental setup

Results and Conclusions

- Emission level of the carbureted motorcycle

The regulated gaseous emissions and particle number over the cycle were measured second by second and evaluated in g/km and compared between all the fuels.

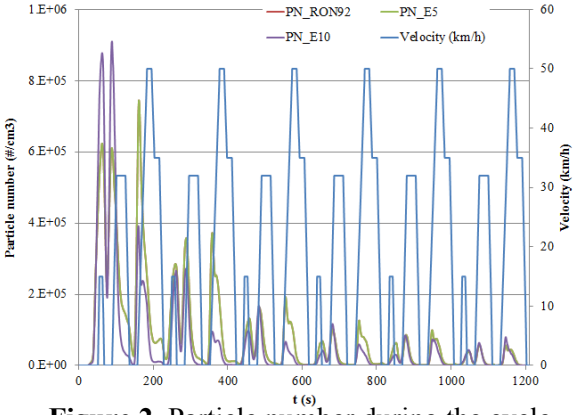

Figure 2. Particle number during the cycle

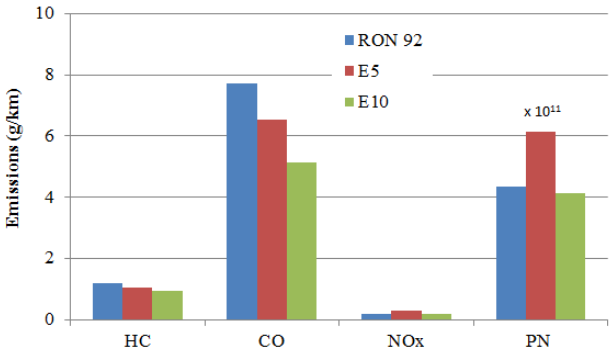

Figure 3. Average emissions over cycle

- Emission level of the fuel injected motorcycle

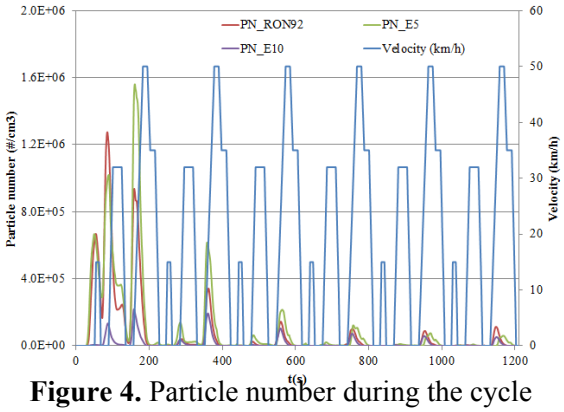

Figure 4. Particle number during the cycle

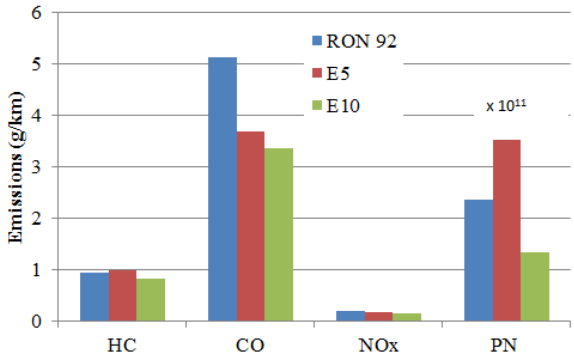

Figure 5. Average emissions over cycle

Results show that using E5 and E10 as alternative fuels for in-use motorcycles is possible to reduce regulated emissions, except NOx emissions in case of the carbureted motorcycle. It can also be seen that the particle number in exhaust gas increases with E5 but decrease with E10 as compared to gasoline in both motorcycles under test.

Acknowledgement

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