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EMISSION FACTORS FOR LIGHT-DUTY VEHICLES EQUIPPED WITH THREE-WAY CATALYTIC CONVERTER BASED ON MICRO- REACTOR STUDIES: A PROPOSAL FOR AMMONIA, NITROUS OXIDE AND MOLECULAR HYDROGEN

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Abstract

In this work, we report a methodology to provide emission factors based on micro-reactor studies. We propose emission factors for ammonia (NH₃, 158 mg/km), nitrous oxide (N₂O, 322 mg/km) and molecular hydrogen (H₂, 72 mg/km) for vehicles equipped with three-way catalytic converter (TWC). Our experimental conditions were similar to those prevailing on vehicles during catalyst light-off and transient urban driving cycle. NH₃ and H₂ emission factors reported in this work are quantitatively similar to those reported from vehicles. However, for N₂O our results are almost 6 times higher than the average reported from vehicles during catalyst light-off. It is possible that the emission factor of N₂O from light-duty vehicles reported during catalyst light-off is underestimated because the time (8.4 min) for recollecting the N₂O emission contained in the exhaust gases is largest than the time (4 min) required to produce the main emission of N₂O on the three way catalyst.

The methodology represents one of the first attempts to predict emission factors from a micro-reactor. Besides, our proposal has the advantage that the main parameters involved in the formation of NH₃, N₂O and H₂ can be controlled. Our method also complements the experimental strategies to estimate emissions, which are difficult to observe during the measurements of these compounds on vehicles.

Key words: ammonia, emission factors, greenhouse gases, hydrogen, nitrous oxide

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