Available online at http://www.journalcra.com

International Journal of Current Research
Vol. 3, Issue, 11, pp.357-358, October, 2011

INTERNATIONAL JOURNAL
OF CURRENT RESEARCH

ISSN: 0975-833X

RESEARCH ARTICLE

EMISSIONS OF GREENHOUSE GASES – A CASE STUDY

Tripathy, A.K.

GHITM Engineering College, Puri, India

ARTICLE INFO

Article History:
Received 5th July, 2011
Received in revised form
8th August, 2011
Accepted 7th September, 2011
Published online 30th October, 2011

Key words:
Alternative emissions, Greenhouse gases, Nitrous oxide fuels, Diesel engine.

ABSTRACT

Releasing and measurement of green house gases were from vehicles and engines operating on a range of different fuels like diesel, biodiesel, compressed natural gas (CNG). Emission rates of CO_2, CH_4, and N_2O are reported.

INTRODUCTION

Releasing of green house gases such as CH_4, CO_2, N_2O, NF_3, CFC etc were monitored and measured [1]. Formation of Nitrous oxide from light-duty gasoline vehicle were takes place [2][3][4][5][6] over the three-way catalyst at lower exhaust temperatures[7][8]. Literature study shows that emissions of nitrous oxide from diesel vehicles depend on the basis of fuel consumption (FC) [9]. One other study [10] reports N_2O factors for heavy-duty diesel vehicles of Euro 1, 2, and 3 emission standards as well as vehicles equipped with selective catalytic NO_X reduction. Concentrations of CO_2, CO, and THC in the dilute exhaust were determined using the technique non dispersive infra-red(NDIR) analyzers. Fuel consumption was calculated on the basis of carbon balance procedures. NO_X emissions (both NO and NO_2) and particulate matter emissions were also measured for each study. Separate samples of dilute exhaust and dilution air for determination of CH_4 and N_2O were collected over each test.

EXPERMENTIAL METHODOLOGY

Emission and measurement of N_2O is made from exhaustsamples using either FTIR or chromatographic analysis / technique with in 24 hrs of collection [10][11]. Using gas chromatograph with FID, methane concentration was determined and its detection limit is 10 mgL^{-1}. Emission of Nitrous oxide from engine was determined using a gas chromatograph with an electron capture detector. The sample is passed through Ascarite™ and sodium sulphate traps to reduce the levels of CO_2 and water vapor if present , respectively, as both gases interfere with the detection of N_2O by electron capture. The limit of detection for N_2O analysis using this instrument is 10 ppb in the dilute exhaust.

RESULTS

The IPCC Third Assessment Report [12] suggests revised GWPs of 23 for CH_4 and 296 for N_2O, but IPCC mandated inventory development practices have not been updated to reflect these new GWPs as of December 2010. The distance based on mass emission rates of CO_2, CH_4, and N_2O along with fuel consumption are for clean diesel and CNG are 1612 gm/km, 1040 gm/km; 1.53 gm/km, 8.21 gm/km; 0.15 gm/km, 0.07 gm/km; 76.2 gm/km, 66.4 gm/km (Diesel fuel); 83.4 gm/km, 10.4 gm/km (gaseous fuel) respectively . The number of individual vehicles (n) and the number of repeat tests per vehicle (r) that contribute to the reported average emission rates and fuel consumption are for clean diesel n=4 r= 4 ; For CNG n= 3, r=2. Oxidation catalysts have no measurable effect on methane emissions but increases nitrous oxide emissions by approximately 50-60 % compared to no after treatment. The catalyzed diesel particle filter has no measurable effect on methane emissions but increases nitrous oxide.

Conclusions

The active regeneration event resulted in a 20% increase in CO_2 emissions, a 36–72% increase in N_2O emissions, and no change in CH_4 emissions. Results from

***Corresponding author:** draniltripathy@gmail.com

a single vehicle equipped with an oxidation catalyst suggest that cold temperature operation (10°C vs. 20°C) shows an average CO_2 emissions increase of 5%, a CH_4 emissions decrease of 40%, and an N_2O emissions increase of 40%. Results from this same vehicle operating over different driving cycles also suggest that CH_4 and N_2O emissions increase for driving cycles that produce lower exhaust temperatures.

Acknowledgment

Our sincere thanks to the persons given suggestion as and when required to carry out the research work.

REFERENCES

[1] Lisa A. Graham*, Greg Rideout, Deborah Rosenblatt, Jill Hendren , 2008 ; Greenhouse gas emissions from heavy-duty vehicles , Atmospheric Environment pp 4666-4681

[2] Graham, L.A., 1999. Gaseous and particulate matter emissions from in-use light duty motor vehicles. Environment Canada, ERMD Report 99-67 (revised October 2003).

[3] Huai, T., Durbin, T.D., Miller, J.W., Norbeck, J.M., 2004. Estimates of the emission rates of nitrous oxide from light- duty vehicles using different chassis dynamometer test cycles. Atmospheric Environment 38, 66216629.

[4] Karlsson, H.L., 2004. Ammonia, nitrous oxide and hydrogen cyanide emissions from five passenger vehicles. Science of The Total Environment 334335, 125132.

[5] Behrentz, E., Ling, R., Rieger, P., Winer, A.M., 2004. Measurements of nitrous oxide emissions from light-duty motor vehicles: a pilot study. Atmospheric Environment 38, 42914303.

[6] Graham, L.A., 2006. Greenhouse gas emissions from light duty vehicles under a variety of driving conditions. In: Proceedings of the Engineering Institute of Canada Climate Change Conference, May 2006.

[7] Priget, M., de Soete, G., Doziere, R., 1991. The effect of aging on nitrous oxide N2O formation by automotive three-way catalysts. In: Catalysis and Automotive Pollution Control II, Proceedings, Elsevier.

[8] Jobson, E., Smedler, G., Malmberg, P., Bernler, H., Hjortsberg, O., Gottberg, I., Rosen, A., 1994. Nitrous oxide formation over three-way catalyst. SAE Paper No. 940926. Society of Automotive Engineers, Warrendale, PA.

[9] Lipman, T.E., Delucchi, M.A., 2002. Emissions of nitrous oxide and methane from conventional and alternative fuel motor vehicles. Climate Change 53, 477516.

[10] Riemersma, I.J., Jordaan, K., Oonk, J., 2003. N2O Emission of HD Vehicles, TNO Report 03.OR.VM.006.1/1JR, TNO Automotive, Delft, The Netherlands.

[11] Michaels, H., Fulper, C., Kolowich, B., 1998. Nitrous oxide emission factors for mobile sources. In: Proceedings of the Air and Waste Management Association Emission Inventory Conference, December 1998, New Orleans, LA, USA.

[12] IPCC, 2001. IPCC Third Assessment Report.

****