EXPLORING USE OF COW URINE FOR EMMISON CONTROL

Abstract

Air pollution is becoming increasingly important for us due to the rising number of petrol and diesel engine vehicles, which is leading to a significant increase in pollution and contributing to global warming. Therefore, it is crucial that we work towards reducing air pollution. The primary objective of this research is to conduct an experimental inquiry aimed at diminishing the release of harmful pollutants, including Hydrocarbons (HC), carbon monoxide (CO), carbon dioxide (CO2), and Nitrous Oxide (NOX), originating from the internal combustion engine of motor vehicles. These noxious emissions stem from the combustion of fuel, contributing to environmental degradation. A promising strategy for mitigating the effluence of these hazardous compounds during the combustion process in vehicular engines involves the utilization of catalytic converters based on noble metals. These catalytic converters effectively transform detrimental CO and HC gases into less harmful byproducts such as CO2 and H2O. Nevertheless, addressing concerns associated with the availability and cost of noble metals prompts the exploration of innovative alternatives. In light of this, a unique approach is proposed, involving the application of natural fluids to curtail emission levels. As an integral part of this research endeavor, various natural liquids, including cow urine, were subjected to pH testing and subsequently introduced into the exhaust system as distinct liquid agents. This research aims to find an alternative and eco-friendly solution to curb automotive emissions and combat air pollution effectively.

Keywords: Air Pollution, Emmision, cow urine, Hydrocarbon, carbon monooxide.

Authors

Mr. Mohnesh Dnyaneshwar Mandhre
PhD Scholar
Department of Mechanical Engineering
Padmashri Dr. Vithalrao Vikhe Patil Institute of Technology
A.Nagar, India.
mohneshphdwork@gmail.com

Dr. Sachin Ghalme
Associate Professor
Department of Mechanical Engineering
Sandip Institute of Technology and Research Centre
Nashik, India.
sachin.ghalme@sitrc.org

Mr. Aditya B. Kale
HOD
Department of Mechanical Engineering
Shri Chhatrapti Shivaji Maharaj College of Engineering
A.Nagar, India.
aditya.kale26@gmail.com

Mr.Amol Klahapure
Assistant Professor
Department of Mechanical Engineering
Shri Chhatrapti Shivaji Maharaj College of Engineering
A.Nagar, India.
mdmscoea1@gmail.com

I. INTRODUCTION

In the realm of internal combustion engines (IC), the release of noxious gases such as HC, CO, and NOX stems from limitations within the engine's combustion cycle. These emissions are particularly pronounced during idling and deceleration, phases where the engine takes in reduced amounts of air for combustion. This phenomenon is primarily attributed to factors such as inadequate oxygen intake in high air-to-fuel mixtures, elevated temperatures prompting nitrogen-oxygen reactions, the presence of lean mixtures, porous deposits, and oil absorption.These emitted gases exert notable ecological impacts, contributing to concerns like the greenhouse effect, acid rain, and global warming. A multitude of strategies have been devised to mitigate engine emissions, encompassing measures like fuel pretreatment, the integration of renewable resources, and the incorporation of fuel additives. The current project proposes the development of an economical apparatus or model designed to regulate vehicle emissions. This innovative model is designed to be universally applicable across vehicle types and features the utilization of cow urine as an absorbent for harmful gases.The proposed model operates through a mechanism wherein exhaust gases from the engine are exposed to a fine mist of cow urine, dispensed through a nozzle. This interaction between cow urine and exhaust gases leads to a substantial reduction in the concentration of harmful constituents present in the emitted gases. These gases are then allowed to pass to atmosphere. In this experimental work; the objective is to modify the silencer of a two-wheeler to incorporate a natural liquid injection system. The selection of natural liquids for the system will be based on their physical and chemical properties, as well as their availability and cost. The modification of the silencer will be carried out in a manner that does not compromise the performance of the two-wheeler. The natural liquid will be injected into the silencer chamber, where it will blend with the exhaust gases, leading to a reduction in pollutants like carbon monoxide, hydrocarbons, and nitrogen oxides.

II. EXPERIMENTAL PROCEDURE

In this experiment Firstly we need to identify the pollutants emitted by two-wheelers whereas the initial step is to identify the various pollutants that are emitted by two-wheelers. Common pollutants include carbon monoxide, hydrocarbons, nitrogen oxides, and particulate matter. Then after studying the properties of natural liquid which having different natural liquids, such as water, cow urine, vegetable oil, and ethanol, have shown potential in reducing emissions from internal combustion engines. The properties of these natural liquids, along with their impact on engine performance, will be thoroughly studied. Lastly modifying the silencer which the silencer or muffler is a critical component of any vehicle designed to reduce engine noise. The modified silencer will be specifically designed to effectively mix the natural liquid with the exhaust gas, thus curbing the pollutants emitted by the engine.

Figure 1 : Experimrnt set up with cow urine

The first step is to design a mixing chamber that will be responsible for blending the natural liquid with the exhaust gas. This design should ensure uniform mixing while maintaining the engine's performance unaffected. Once the modified silencer is ready, it is imperative to conduct experiments to assess its efficiency in reducing emissions. Emissions testing will be performed both before and after installing the modified silencer.

After conducting the experiments, the collected data will be thoroughly analyzed to determine the effectiveness of the modified silencer in reducing emissions. In starting we obtain a standard two-wheeler in good working condition to be used for the experiment.

After that we construct a modified silencer capable of injecting the natural liquid into the exhaust stream of the two-wheeler. This can be achieved by attaching a container of the natural liquid to the silencer and connecting it to a tube leading into the exhaust pipe of the two-wheeler. Select a suitable natural liquid known for its ability to reduce exhaust emissions from internal combustion engines. In this experiment we select cow urine for experiment. But we having options may include a plant-based biofuel or a specially formulated additive designed for emission reduction. After selection of cow urine we set up measurement equipment, such as a gas analyzer, to measure emissions from the two-wheeler with and without the natural liquid injection system. Conduct a baseline test without the modified silencer and the natural liquid injection system to establish the emissions produced under normal conditions. Then install the modified silencer and natural liquid injection system on the two-wheeler and conduct another test under similar conditions as the baseline test. Record emissions measurements and compare them to the baseline results. Analyze the data collected from the tests to assess the effectiveness of the modified silencer and natural liquid injection system in reducing emissions from the two-wheeler. During the testing process, the selected liquids will be introduced into the liquid inlet valve as the flue gas passes through the silencer. The injected liquid will combine with the flue gas, resulting in the discharge of gases. Emission measurements will be taken using a gas analyzer to evaluate the results for each tested liquid.

Upon introducing water into the silencer, a chemical reaction ensues wherein it interacts with carbon monoxide. This interaction prompts the conversion of carbon monoxide

into carbon dioxide and hydrogen gas. In a similar fashion, the incorporation of cow urine into the silencer initiates reactions with carbon monoxide, nitrogen oxide, and oxygen. These reactions facilitate the release of carbon dioxide, nitrogen, and water as byproducts. he introduction of water and cow urine into the exhaust system catalyzes transformations within the flue gases confined within the silencer. Consequently, these reactions facilitate the conversion of the original exhaust gases into environmentally benign compounds, including carbon dioxide, nitrogen, and water. This intricate process culminates in the regulated and controlled emission of exhaust gases.

III. RESULT AND DISCUSSION

The test results demonstrate that both the modified silencer and the natural liquid injection system effectively reduce emissions from the two-wheeler. The data gathered from the tests indicates that the combination of the modified silencer and natural liquid injection system significantly reduces the release of harmful gases, such as carbon monoxide and hydrocarbons, which are known to be detrimental to the environment and human health.

The incorporation of natural liquid into the modified silencer proves to be a promising approach for curbing emissions from two-wheelers. It is worth noting that further testing and research may be necessary to develop more advanced and efficient technologies for pollution control from internal combustion engines. Nevertheless, this experimental setup exhibits positive results in reducing emissions from two-wheelers and lays a strong foundation for future research in the field of pollution control.

In conclusion, the modified silencer and natural liquid injection system have the potential to contribute significantly to a cleaner and healthier environment by effectively reducing the emission of harmful gases.

The utilization of cow urine as a means to reduce pollutant particles involves exploiting its inherent properties to catalyze chemical reactions that lead to the transformation of harmful compounds into less harmful or inert substances. Cow urine comprises diverse components with the potential to engage with pollutant particles within exhaust emissions. Notably, cow urine includes ammonia (NH3) and urea (NH2CONH2), both possessing the capability to interact with acidic and detrimental compounds. Ammonia, an alkaline substance naturally found in cow urine, can effectively react with acidic gases like sulfur dioxide (SO2) and nitrogen oxides (NOx) that are commonly present in exhaust discharges. The outcomes of these reactions involve the creation of ammonium salts, which exhibit decreased harm potential and can be safely deposited within the environment.

Table 1: Idling Emission

Parameter	Pollutant (as applicable)	Units (as applicable)	Average Reading	
			Before Experiment Set Up	After Experimernt Set Up
Idling Emissions	Carbon Monooxide (CO)	Percentage (%)	0.53	0.48

Parameter	Pollutant (as applicable)	Units (as applicable)	Average Reading	
			Before Experiment Set Up	After Experimernt Set Up
	Hydrocarbon (HC)	ppm	174	81

IV. CONCLUSION

The importance finding emerged from this investigation, can be as follows:

- It can be possible to reduce emission by using natural resources like cow urine.
- If we see result regarding Hydrocarbon it reduce by 50% with cow urine set up.

REFERENCES

[1] N. G. Renganathan, J. Jeyaprakash, and P. Renganathan, “Experimental Investigation on the Performance and Emission Characteristics of a SI Engine with Natural Gasoline and Methanol as Fuel,” International Journal of Engineering and Technology, vol. 3, no. 6, pp. 662–674, 2011.
[2] M.Shakthivel and R. Saravanan, “Experimental Investigation of Performance and Emission Characteristics of Single Cylinder SI Engine Fueled with Bio Diesel Blends,” International Journal of Engineering Science and Technology, vol. 3, no. 3, pp. 2399–2408, 2011.
[3] R. Vijayan and J. Kishore, “Experimental Investigation for Reducing Exhaust Emission in Two Wheeler by Using Nano Fuel Additives as Catalysts,” Proceedings of 2nd International Conference on Advances in Science & Technology, vol. 7, no. 2, pp. 228–234, 2017.
[4] A. Kiran Kumar and B. N. Nagesh, “Experimental Investigation on Pollution Control in Two Stroke SI Engine Using NanoFluids in Modified Silencer,” Proceedings of 2nd International Conference on Advances in Science, Engineering, Technology and Healthcare, vol. 3, no. 3, pp. 156–160, 2015.
[5] R.Saravanan and Chandrasekaran, “Experimental Investigation on the Performance and Emission Characteristics of a Two Stroke SI Engine using Natural Gasoline and Methanol as Fuel,” International Journal of Engineering Research and Technology, vol. 3, no. 2, pp. 2124–2129, 2014.
[6] Mohebi, A., Jafarzadeh, S., Pashae,J. and Shirnezhad, M., "Experimental studying of the effect of egr distribution on the combustion, emissions and performance in a turbocharged di diesel engine", International Journal of Engineering, Transactions A: Basics, Vol. 26, No. 1, (2013)
[7] Kousoulidou, M., Fontaras, G., Ntziachristos, L., Bonnel, P., Samaras, Z. and Dilara, P., "Use of portable emissions measurement system (PEMS) for the development and validation of passenger car emission factors", Atmospheric Environment, Vol. 64, (2013)
[8] Twigg, M.V., "Progress and future challenges in controlling automotive exhaust gas emissions", Applied Catalysis B: Environmental, Vol. 70, No. 1-4, (2007)
[9] Datta, A. and Mandal, B.K., "A comprehensive review of biodiesel as an alternative fuel for compression ignition engine", Renewable and Sustainable Energy Reviews, Vol. 57, (2016)
[10] Ghadikolaei, M.A., "Effect of alcohol blend and fumigation on regulated and unregulated emissions of ic engines—a review", Renewable and Sustainable Energy Reviews, Vol. 57, (2016)

