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## EXHAUST EMISSION CONTROL BY USING COW PEE

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### Abstract

In this emission control system we focused on lowering the emission of toxic gases such as Hydrocarbons (HC), Carbon monoxide (CO) and Nitrous oxide (NO<sub>x</sub>) from the IC engines of automotive vehicles released as a result of combustion of the fuel thereby reducing the environment pollution. The discharge of toxic substances during the combustion in the automotive vehicles can be reduced by noble metal based catalytic converters which convert toxic CO and HC gases to CO<sub>2</sub> and H<sub>2</sub>O respectively. In order to overcome the issues related to the use of noble metals, a novel method utilizing the natural liquids for minimizing the emission level is suggested.

The main gases from the exhaust of vehicles which are harmful to our environment are as follows:-Hydrocarbon (HC), Carbon monoxide (CO), Carbon dioxide (CO<sub>2</sub>), Nitrox ide (NO<sub>x</sub>).These gases are the main reason for pollution. In this technique percentage of these gases are reduced by spraying cow pee over them and these gases reacts with the contents in the cow pee and decreases them to a greater extent.

**Key Words:** Engine, Cowpee, Exhaust gases.

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### 1. INTRODUCTION:

The main problem faced by living things on the earth is unbalance environment cause by pollution. The greater extent of air pollution is due to the automobiles. According to the latest report submitted by UNO & NASA, two hundred cores automobiles are running on the earth at the present time. In that report, according to both, 75% of Carbon dioxide emission is due to automobiles. [1]

In addition to the automobiles, Industries, Factories and Mining equipment's emits the gases which are harmful to human beings, nature and also animals. These gases cause unbalance of environment.

Emissions that are principal pollutants of concern include:-

- Hydrocarbon (HC)
- Carbon Monoxide (CO)
- Carbon Dioxide (CO<sub>2</sub>)
- Nitrox ides (NO<sub>x</sub>)

These gases cause worse effects on environment and human health, via:-

Unbalance of environment like melting of Ice Rivers,

Glaziers, increase in levels of ocean and increasing temperature of earth. Human beings are the immediate victims from cancer, respiratory problems, eye irritation and headache etc.It also causes barrenness of land. [2]

The need to control the emission from automobiles gave rise to the development of emission control devices to reduce the percentage of harmful gases due to the combustion process in the engine of automobiles.

In this technique cow pee is spray on the harmful gases from engine exhaust with the help of nozzles by using submersible pump operated on 12v DC supply. The contents in cow pee react with gases as they come in contact with each other and harmful contents decreases in high amount. [7]

### 1.2 Objective

1. To reduce the percentage of harmful product present in exhaust of engine.
2. To reduce HC, CO, CO<sub>2</sub>, NO<sub>x</sub> to great amount by using cow pee.

## Issue

3. To provide cost effective solution over present emission control technologies/devices.
4. To fabricate eco-friendly emission control device at very low cost.
5. To fabricate portable model having very less maintenance.
6. To fabricate after treatment device having no worse effect on Environment.

## 2. LITERATURE REVIEW:-

This project is mostly focussed on reducing the exhaust harmful gases such as Hydrocarbons (HC), Carbon monoxide (CO) and Nitrous oxide (NO<sub>x</sub>) from the engines of vehicles as a result of reducing the environmental pollution. [1]

The discharge level of these toxic gases are maximum at idle and deceleration state where less amount of air is taken by the engine for combustion. These gases mainly affect the environment causing greenhouse effect, acid rain, global warming etc. Numerous substitutes like pre-treatment of fuel, usage of renewable resources, adding additives to fuel etc. have been developed to minimize the emission level of the engine. The first widespread introduction of catalytic converters in vehicle starting with 1975. In 1981 two-way catalytic converters were rendered obsolete by "three-way" converters. All the techniques developed so far, catalytic converter can be suggested to be the best way to control the emission level.

Generally catalytic converter consists of two types of catalysts via reduction catalyst and oxidation catalyst. Both the catalyst contains ceramic structure coated with a noble metal catalyst of platinum/rhodium/palladium. The reduction catalyst utilizes platinum and rhodium to minimize the discharge of NO<sub>x</sub> whereas the oxidation catalyst uses platinum and palladium. During the reduction catalyst process, molecules of NO react with the catalyst, which separates the nitrogen atom from the molecule and freezes the oxygen atom in O<sub>2</sub> form. Typically there are two types of design pattern for catalytic converters via honeycomb structure and ceramic bead structure. The most common type of structure for car is the honeycomb structure. Along with catalytic converters there are several other emission reduction technologies are present, like EGR, DOC, DPF, SCR etc.

**Exhaust gas recirculation (EGR)** is a nitrogen oxide (NO<sub>x</sub>) emissions reduction technique used in petrol and diesel engines. EGR works by recirculating a portion of an engine's exhaust gas back to the engine cylinders. This

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dilutes the O<sub>2</sub> in the incoming air stream and provides gases inert to combustion to act as absorbents of combustion heat to reduce peak in-cylinder temperatures. NO<sub>x</sub> is produced in a narrow band of high cylinder temperatures and pressures. In order to reduce NO<sub>x</sub> emissions, exhaust gas is recirculated back into combustion chamber and mixed with fresh air at intake stroke. The recirculated exhaust gases serve to lower the combustion temperature, a condition that favours lower production of nitrogen oxides. Consequently the efficiency of combustion is worsened leading to decrease of combustion temperature which means reducing in NO<sub>x</sub>. By 1973, first widespread introduction of catalytic converters used in vehicles. [3]

**Selective catalytic reduction (SCR)** is a means of converting nitrogen oxides, and water. A gaseous is a reaction product when urea is used as the reductant. Reductant typically anhydrous ammonia, aqueous ammonia or urea, is added to a stream of flue or exhaust gas and is adsorbed onto a catalyst. Selective catalytic reduction of NO<sub>x</sub> using ammonia as the reducing agent was patented in the United States by the Engelhard Corporation in 1957. Development of SCR technology continued in Japan and the US in the early 1960s with research focusing on less expensive and more durable catalyst agents. The first large-scale SCR was installed by the IHI Corporation in 1978. Commercial selective catalytic reduction systems are typically found on large utility boilers, industrial boilers, and municipal solid waste boilers and have been shown to reduce NO<sub>x</sub> by 70-95%. [4]

In order to overcome the issues related to use noble metals also problems encountered in present systems of exhaust gas reductions. A novel method utilizing the cow pee for minimizing the emission level suggested. The cow pee is spray finely on harmful exhaust gases in order to reduce contents of NO<sub>x</sub>, CO, HC and CO<sub>2</sub>. This technique also proved effective after taking various testing's on vehicles, generates engines. In December 2016, Mechanical Engineers, A Saravanan and R Ramaswamy from Nagercoil in Tamil Nadu made experimental research on Emission control by using Natural fluids and published research article on "EMISSION CONTROL IN CATALYTIC CONVERTER BY USING NATURAL FLUIDS". Their experimental ring consists of four stroke, dual cylinder diesel engine which is connected to hydraulic dynamometer. Their experimental analysis highlighted that the amount of NO<sub>x</sub>, CO<sub>2</sub>, CO and HC discharge can be reduced by using some natural fluids such as water, cow pee etc. [5]

## 3. Contents in Cow pee (Gomutra):-

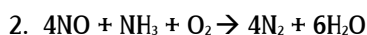
1. Nitrogen (N<sub>2</sub>)
2. Sulphur (S)
3. Ammonia (NH<sub>3</sub>)

4. Urea ( $\text{CO}(\text{NH}_2)_2$ )
5. Uric acid ( $\text{C}_3\text{H}_4\text{N}_4\text{O}_3$ )
6. Phosphate (P)
7. Sodium (Na)
8. Carboic Acid ( $\text{C}_6\text{H}_5\text{OH}$ )
9. Water ( $\text{H}_2\text{O}$ )
10. Hippuric Acid ( $\text{C}_9\text{H}_9\text{NO}_3$ )
11. Creatinine ( $\text{C}_4\text{H}_7\text{N}_3\text{O}$ )
12. Aurum Hydroxide ( $\text{Au}(\text{OH})_3$ )
13. Potassium (K)
14. Manganese (Mn)
15. Calcium (Ca)
16. Salt (NaCl)
17. Lactose ( $\text{C}_{12}\text{H}_{22}\text{O}_{11}$ )
18. Enzymes
19. Vitamin A, B, C, D
20. Other Minerals etc.

#### 4. Reactions Involved :-



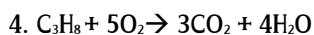
Urea + water + nitrogen dioxides à ammonia + carbon dioxide + water vapour



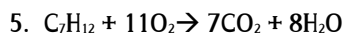
Nitrogen oxides + ammonia + oxygen à nitrogen + water vapour



Water + carbon monoxide à hydrogen + carbon dioxide



Propane + oxygen à carbon dioxide + water



Cycloheptane + oxygen à carbon dioxide + water.  
[6]

## 5. CONCLUSION

1. From the observation and result we can conclude that the system is feasible.
2. As seen in resulted it reduces harmful contents of exhaust of engine to greater extent. Thus it can be concluded that it workable at factories, locomotives and at any other pollution sources.
3. At it is more handy, less costly and eco-friendly. Thus it has scope to fabricate.

## 6. FUTURE SCOPE

1. It also can be designed for industries, factories, electrical generators, mining equipment's for pollution reduction and also applicable for all kinds of air pollution sources.
2. Alarm system can be built in vehicle body on level of cow pee getting less.
3. Provision can be done to start and stop the working of unite with engine.
4. Can be designed for diesel engine locomotive.
5. By making nano design of unit, it can directly fit in silencer system as a catalytic converter.

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