

Design and Fabrication of Aqua Silencer

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Abstract:- The heart of each and every living being is the purity of air. Nowadays, air pollution is a huge issue that has arisen in the modern period. Carbon monoxide and oxides of nitrogen (NOx) are the major pollutants released by exhaust gases. As a result, it is vital to limit pollution caused by engine exhaust emissions. "Aqua Silencer" is an attempt to limit overall emissions and unwanted sound at a vehicle's tail pipe before it is vented into the atmosphere. It can be installed at the tail pipe of a vehicle's exhaust system alongside or instead of a catalytic converter. Water can be used to control the sound produced by an engine because sound produced under water is less audible than sound emitted in the environment. This is because too little sprockets in water molecules, which reduce the amplitude of the sound and hence reduce the volume.

Index Terms- Aqua silencer, Exhaust gas, Activated charcoal, Lime water, Noise, and Galvanized iron.

1. INTRODUCTION

An aqua silencer has to be essentially a perforated tube that is inserted at the exhaust pipe's termination. The holes in perforated tube come in a variety of sizes. The goal of varying hole diameters is to break up gas mass and generate smaller gas bubbles. The perforated tube is usually drilled with four sets of holes. The perforated tube's other end is sealed with an end cap. A layer of activated charcoal is placed around the perimeter of the perforated tube, and then a metallic mesh is placed over it.

1.1 Research

The project looked at the smoke content of exhaust gas before and after treatment, and it was discovered that there was a significant reduction in emissions, as evidenced by the test results. Using a perforated tube and charcoal, the aqua silencer is more effective in reducing emissions pollutants from engine exhaust. Sound can be reduced by utilizing water as a medium, and exhaust emissions can be controlled to a greater extent by employing activated charcoal in water.

1.2 OBJECTIVE

Recently, there has been a growing concern over the expansion of traffic and the discharge of modern waste streams into the environment. The exhaust from the engine contains air toxins and a variety of species. In nature, almost all poisons are poisonous. CO, CO₂, NOX, and Hydrocarbon are some of the precedents. As a result, the evacuation of these pollutants was picked as the most important problem. In developed countries, there are a few expensive options. Despite the fact that in developing countries (such as India), a more cost-effective and financially viable absorption process is used. It was chosen for the current study because it may be used as a suitable absorbent with several low-cost synthetic chemicals. In this way, the current research aims to put the newly developed technology to the test.

2. METHODOLOGY

The perforated tube turns high mass bubbles into low mass bubbles as the exhaust gases reach the Aqua silencer, and then the gases flow through the charcoal layer, which purifies the gases once again. It has a high absorption capacity since it is very porous and contains additional free valences. Some of the gases may dissolve in the water after passing over the charcoal layer, and the exhaust gases eventually escape through the hole into the atmosphere. As a result, the aqua silencer helps to reduce noise and pollution.

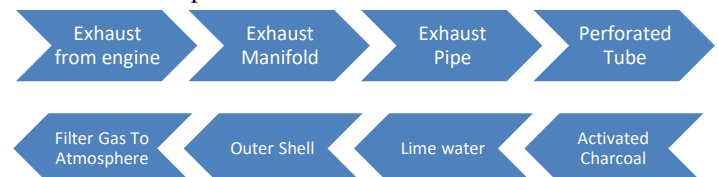


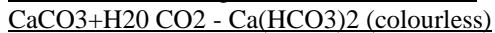
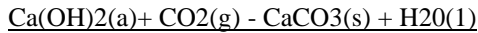
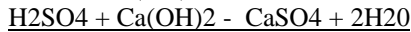
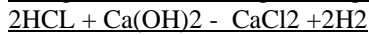
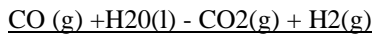
Fig 1 Block Diagram

2.1 Methods to control water pollution

Aqua silencer has two procedures that are used to control water pollution. The dissolved gases contaminate the water. When these gases come into contact with water, they produce acids such as carbonic acid, sulfuric acid, and nitro genic acid among others. The phenols in petroleum products produce a stifling odor. When Sulphur gas reacts with water, hydrogen sulphide is formed, giving a rotten egg odor. These gases must be managed in order to reduce water pollution. The approach that we used is washing with lime water. The process of absorption (using charcoal) In order to control water pollution, we adopted the absorption process method (activated charcoal) in our project. Granular or powdered activated charcoal is offered. It is permeable and has free valences.

2.2 Effects of dissolved gasses on water

Reaction



2.3 COMPONENTS



Fig 2 Perforated tube



Fig 3 Carbon layer



Fig 4 Outer shell



Fig 5 Final Assembly

3. CAD MODEL OF AQUA SILENCER

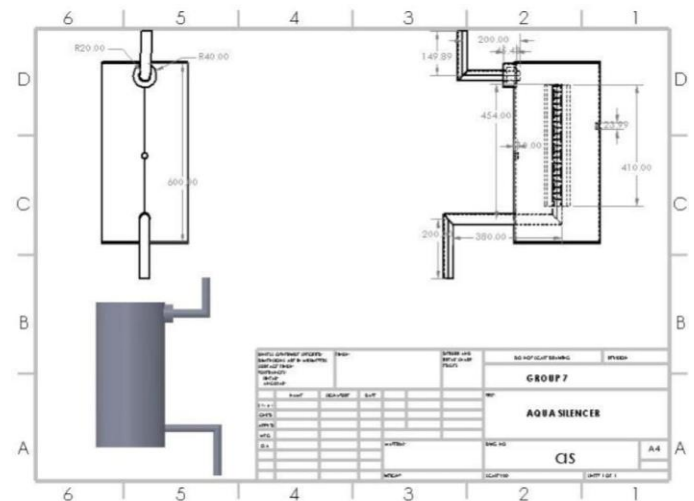


Fig 6 Three Dimensional Model

4. MATERIAL ANALYSIS

Galvanized Iron is used for the shell of aqua silencer because it is efficient, cheap and easily available.

5. RESULTS

Test are taken on ACTIVA 3G

Sr. No.	Pollutant (as applicable)	Units (as applicable)	Emission Limits	Measured Value (upto 2 decimal places)
1	Carbon Monoxide (CO)	percentage (%)	3.0	0.24
2	Hydrocarbon, (THC/HC)	ppm	3000.0	130.0
3	CO	percentage (%)	0.0	0.0
4	RPM	RPM	2500 ± 200	0.0
5	Lambda	-	1 ± 0.03	0.0
6	Smoke Density	Light absorption coefficient	1/metre	0.0

This PUC certificate is system generated through the national register of motor vehicles and does not require any signature.

Note : 1. Vehicle owners to link their mobile numbers to registered vehicle by logging to <https://vahan.parivahan.gov.in>

Authorized Signature with stamp of PUC operator (60mm x 20 mm)

Two Wheeler	Third Party	4 Wheeler (PRIVATE CAR)	Third Party	Service Charge
150cc OR Less	828	1000cc OR Less	2444	50
151 To 350cc	1349	1001 To 1500cc	3683	50
		1501 And Above	9310	50

Fig 7 PUC without Aqua Silencer

Sr. No.	Pollutant (as applicable)	Units (as applicable)	Emission Limits	Measured Value (upto 2 decimal places)
1	Carbon Monoxide (CO)	percentage (%)	3.0	0.15
2	Hydrocarbon, (THC/HC)	ppm	3000.0	115.0
3	CO	percentage (%)	0.0	0.0
4	RPM	RPM	2500 ± 200	0.0
5	Lambda	-	1 ± 0.03	0.0
6	Smoke Density	Light absorption coefficient	1/metre	0.0

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		1501 And Above	9310	50

Fig 8 PUC with Aqua Silencer

6. CONCLUSION

Sound can be reduced by utilizing water as a medium, and exhaust emissions can be controlled to a greater extent by employing activated charcoal in water. It was discovered that "Aqua Silencer" is capable of reducing carbon footprints by up to 40%. It has been discovered to be more appropriate. It emits no smoke and produces no pollution and it is also quite inexpensive.

Sound can be effectively reduced in aqua silencer by using water as a medium. Because sound is less audible in water, the noise level is reduced by 20% compared to a traditional suppressor.

7. FUTURE SCOPE

Naturally, there has been growing concern in recent years about the increasing rate of mobility and the release of modern waste waters into the environment as well as the arrival of toxic outflow into the climate from vehicle and mechanical motors. The new silencer, for example, could be a response to the decrease in deadly outflows into nature from engines. The new silencer is currently suitable for usage in mechanical motors and heavy-duty vehicles. In any event, R&D offices have considered the issue and are working on developing and updating the silencer so that it can be installed in vehicles while maintaining its streamlined qualities and supporting or increasing its capability.

8. REFERENCE

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