



e-ISSN: 2319-8753 | p-ISSN: 2320-6710

# IJRSET

International Journal of Innovative Research in  
**SCIENCE | ENGINEERING | TECHNOLOGY**

# INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 11, Issue 5, May 2022

**ISSN** INTERNATIONAL  
STANDARD  
SERIAL  
NUMBER  
INDIA

Impact Factor: 8.118



# Fabrication and Experimental Investigates on of Aqua Silencer

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**ABSTRACT:** An Aqua Silencer is an idea which is intended to supplant regular single unit motor silencers on board structure. It is made to manage the control of generally emanations and bothersome sound at the motor exhaust of the vehicle. A water silencer is fitted to the fumes line of the motor. The initiated charcoal channels the destructive Sulfur and nitrous substance delivered from the motor. Sound delivered submerged is less hearable than it created in air. Vehicles are not just the wellspring of air contamination, different sources, for example, electric power creating stations, modern and homegrown fuel utilization, reject consuming, modern handling and so on likewise contribute vigorously to pollution of our current circumstance so genuine endeavors must ought to be made to ration of our current circumstance from corruption. A water silencer is an endeavor toward this path; it is chiefly managing outflows and sound created in motor of vehicle.

**KEYWORDS:** Emission, reduce noise and pollution.

## I. INTRODUCTION

Water silencer is made to decrease the degree of clamor and outflow in IC motors. The super true why we go for water silencer is, in the present life the air contamination makes actual sick impacts the people and furthermore to the nature. The primary explanation for the air contamination is auto delivering the gases like carbon dioxide and unburnt Hydrocarbon. Fossil fuel byproduct is the arrival of carbon into the air. The fossil fuel byproducts are straightforwardly alluded to the ozone depleting substance emanations. The principal supporters of environmental change. Since ozone harming substance discharges are frequently determined as carbon dioxide counterparts, they are called as fossil fuel byproducts, while examining an unnatural weather change or the nursery impact. In businesses the consuming of non-renewable energy sources has filling in high worth, at the same time expanding of carbon dioxide levels in our climate and accordingly the fast increment of a worldwide temperature alteration. To stay away from this kind of gases, water silencer is presented. At present, generally fumes emanations, crankcase blowby and evaporative misfortunes are the principal constituents contributing towards fumes outflows if there should be an occurrence of vehicles exhaust system is utilized for dealing with carbon monoxide (CO), unburnt hydrocarbons (UBHC) and oxides of nitrogen (NOx), and a lot more gasses. Suppressor is utilized for controlling unwanted commotion at tail line of vehicle exhaust framework. It additionally controls the fumes gas distribution (EGR) for controlling crankcase pass up. An Aqua Silencer is primarily managing control of outflow and clamor in vehicle exhaust. By utilizing dynamic charcoal, punctured tube and external shell is built. A water silencer is fitted to the fumes line of motor. The initiated charcoal channels the destructive Sulfur and nitrous substance delivered from the motor. Sound delivered submerged is less hearable than it created in air. This predominantly in light of little sprockets in water atoms brings down the sound level. Due to this property water is utilized in this silencer and consequently its name AQUA SILENCER. It is tried in single chamber 4 stroke petroleum motor the clamor and smoke level is significant not exactly the traditional silencer. The outflow can be constrained by utilizing the enacted charcoal layer and it is profoundly permeable and gangs' without extra valences so it has high ingestion limit. Thus, ingest the gases from the motor and delivery significantly less situation to the climate. The commotion and smoke level are extensively not exactly the traditional silencer, no need of exhaust system and simple to introduce. The reason for this examination is to defeated contaminations in a productive manner as opposed to utilizing traditional silencer is source course for air and commotion contaminations. Thus, to lessen these water silencers are involved which is the most recent innovation in the pattern to diminish these two contaminations yet it has a downside that the silencer can't satisfy the occupation as the charcoal and water ought to be supplanted and the span or the lifetime of the silencer work continuously decreases. Notwithstanding intensity and



water fume, the poisons shaped in motor exhaust are, Carbon monoxide (CO), Carbon dioxide (CO<sub>2</sub>), Oxides of Nitrogen (NO<sub>x</sub>), Sulfur dioxide (SO<sub>2</sub>). Particulate and Unburned Hydrocarbons (UBHC), Respirable flammable Dust (RCD). The above contaminating items in the motor exhaust are to be constrained by the Aqua Silencer.

## II. BASIC FUNCTIONING

The fumes gas from the chamber enters the double channel suppressor through a punctured line. The gas initial enters the suppressor's fundamental channel through a punctured cylinder. Punctured pipe is a unique sort of line, comprising of cross areas of various distances across. In this way, the permeable cylinder changes over excellent air pockets into low quality air pockets. In the essential channel, lime water responds with harmful gases and diminishes its fixation. From that point forward, they go through an optional channel made of charcoal again to refine the gas. Charcoal is profoundly permeable and has extra free valence. Subsequently, it has high adsorption limit. At last, the fumes gas is released into the air through the opening.

The double channel suppressor utilizes a combination of water and limestone and is additional successful in diminishing fumes outflows from motor exhaust. By utilizing a combination of water and limestone, the back tension will be kept consistent and the sound level will be decreased. By involving water as a medium, sound can be diminished, and by involving limestone in water, we have some control over exhaust emanations to a more noteworthy level. Water defilement in the double channel suppressor was viewed as unimportant in light of the fact that the sharpness in the double channel suppressor is supposed to be lower than the hazardous acidity. It's sans smoke and contamination free, and it's modest. Subsequently, the twofold sifted silencer diminishes clamor and contamination. The exhibition of a double channel silencer is practically equivalent to an ordinary silencer.

### CONSTRUCTION: -

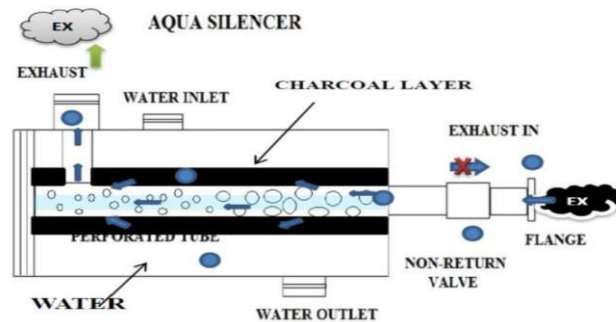
Essentially, a water silencer is introduced with a punctured cylinder which is mounted toward the finish of the exhaust pipe. The punctured cylinder is having openings of various distances across. For the most part, 4 arrangements of openings are bored on the punctured cylinder. The reason for giving different breadth opening is to separate gas mass to frame more modest gas bubbles which can be effectively consumed by the charcoal layer. The opposite finish of the punctured cylinder is shut by plug.

Around the boundary of the punctured cylinder a layer of enacted charcoal is given and further a metallic cross section covers it. There are a few charcoal pieces inside the punctured cylinder for expanding the assimilation rate. It is profoundly permeable and have extra free valences so it has high ingestion limit. Subsequent to disregarding the charcoal layer a portion of the gases might break down into the water. We have added urea in the water because of which the hydrogen connections among urea and water were viewed as nearly more vulnerable than those between water atoms. It gets concentrated with water because of hydrophobic impact. It is viewed as 20% successful for the water vanishing rate. The entire unit is then positioned in a water holder. A little opening is accommodated the power source of the exhaust gases at the highest point of the holder and at the last a channel plug is mounted for intermittently cleaning of the compartment. Likewise, a filler plug from which water can be filled is mounted at the highest point of the compartment. A non-return valve is given at the passage of the fumes pipe which forestalls the reverse of water and fumes gases in the motor chamber. Along these lines, water silencer diminishes commotion and contamination.

### FUNCTIONING IN DETAIL: -

The primary part of water silencer is punctured cylinder. It fitted at end of fumes line of motor. This punctured cylinder comprises of various distance across openings to change expansion in mass air pockets over completely to diminishing mass air pockets on punctured tube. By and large, 4 arrangements of openings are bored. The attachment is given to close the opposite finish of punctured tube. The initiated charcoal layer and metallic cross section covers is given around periphery of punctured tube. The punctured cylinder contains the lime water inside it which artificially responds with fumes gas from This entire unit or framework is then positioned in the holder which is loaded up with water to eliminate fumes gas. The little opening is given at the highest point of water holder and at the lower part of the compartment opening is accommodate cleaning reason. At the highest point of holder fulfiller plug is likewise given. A

non-return valve is given at the delta of exhaust line to keep away from reverse of gases and water too. In the event that fumes gas enters to water silencer, punctured tube changes the high mass of air pockets over completely to the low mass.



**Fig 1:- Functioning of a Aqua Silencer**

Alterations and future extension for this undertaking should be possible by executing nano tubes inside the punctured cylinder. The nano-tubes are polymers which have the manganese in its which will trap the exhaust contaminations inside it and isolates the hydrogen atoms. These hydrogen particles then can be utilized as regenerative to charge the energy components. The nano tubes are fitted in punctured tube which is drenched inside the water. Thus, the cleansing system is diminished and doesn't need separate procedure. Nano cylinders can be utilized rather than charcoal in Aqua Silencer. As it is similarly costly, further changes are being done to upgrade more capacities. The justification for why we choose water silencer is that, in our reality, air contamination causes genuinely and intellectually destructive impacts to individuals and furthermore to the climate. The fundamental commitment of air contamination comes from autos and modern motors delivering gases like carbon dioxide and unburnt Hydrocarbons. By involving water as a medium, the sound delivered can be brought down. With additional turn of events, it can likewise be utilized in cars.

#### COMPONENTS AND EXPLANATION: -

We have worked upon design of parts and drawing of aqua Silencer. The fabrication of aqua silencer requires the following components to complete the operation of the silencer.

1. Perforated tube
2. U-bend
3. Activated Charcoal layer
4. Outer shell
5. Flange
6. Non return valve

#### PERFORATED TUBE: -

Perforated Tube is a cylinder which has little openings through which water can course through them. Since the line retains the water and depletes it, it is an extraordinary underground waste framework. The line is comprised of assortment of materials like PVC, mud, concrete, iron and polythene. During the adjustment of season, the line can break or get harmed in this manner ought to have most extreme adaptability and be light in weight.



**Fig 2:- Perforated Tube**

**U Bend :-**

The U Bend is given rather than a non-return valve which is a mechanical gadget, which regularly permits liquid (fluid or gas) to move through it in only one heading. The water silencer was loaded up with water and it is straightforwardly associated with the fumes line of the motor. There is an opportunity for the water to get go into the motor chamber. To stay away from this, U twist is utilized.



**Fig 3: - U-bend**



**Fig 4 : -Activated Charcoal Layer**

**CHARACOAL LAYER: -**

The charcoal layer has really retaining limit since it has more surface region. This charcoal is called as ACTIVATED CHARCOAL. It is created by warming the charcoal above 1500,°c for a few hours in a burner. Its surface region gets expanded.

**OUTER SHELL: -**

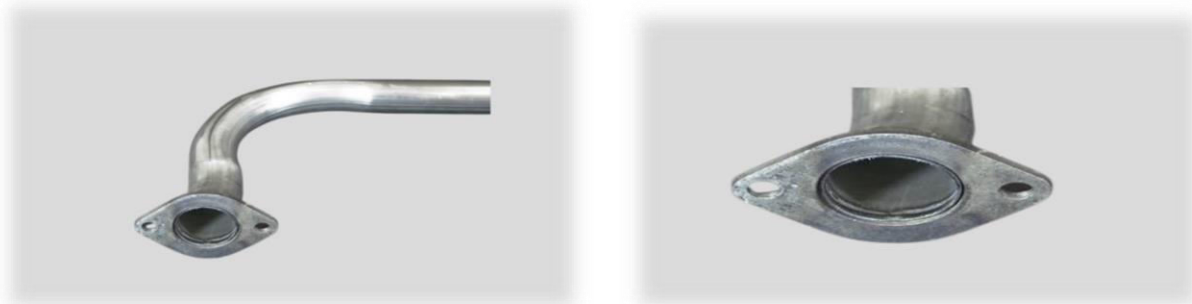
The entire arrangement was kept inside the external shell. It is comprised of iron or steel. The water delta, outlet and exhaust tube were given in the actual shell.



**Fig 5 :- Outer Shell**

**FLANGE: -**

A flange joint is a connection of pipes, where the connecting pieces have flanges by which the parts are bolted together. Here flange is used to connect the silencer to the engine.



**Fig 6: -Flange**

**NON-RETURN VALVE: -**

A non-return valve permits a medium to stream in just a single heading and is fitted to guarantee that the medium courses through a line in the correct bearing, where tension circumstances may somehow or another reason turned around stream. The move through the non - return valve causes a somewhat enormous strain drop, which must be considered while planning the framework.



**Fig 7: -Non-Return Valve**



### **SELECTION OF MATERIAL: -**

Factors Determining the Choice of Materials: The different elements which decide the decision of material are examined underneath.

#### **Properties:**

The material chose should have the fundamental properties for the proposed application. The different necessities to be fulfilled can be weight, surface completion, unbending nature, capacity to endure ecological assault from synthetics, administration life. dependability and so forth.

The accompanying sorts of rule properties of materials can influence material determination

1. Physical
2. Mechanical
3. According to assembling perspective
4. Compound

The different actual properties considered are liquefying point, warm Conductivity, explicit intensity, coefficient of warm development, explicit gravity, electrical conductivity, attractive purposes etc. The different mechanical properties thought about are strength in malleable, Compressive shear, twisting, torsional and clasp load, exhaustion opposition, influence obstruction, versatile cutoff, perseverance limit, modulus of flexibility, hardness, wear obstruction and sliding properties.

The different properties considered according to the assembling perspective are,

- 1) Cast capacity
- 2) Weld capacity
- 3) Surface properties
- 4) Shrinkage
- 5) Drawing properties, and so forth.

**Cost:** The expense of material assumes a significant part in material determination and ought to be thought about cautiously. Most frequently, factors like piece use, appearance, and so on are likewise associated with material determination.

**Quality Required:** This by and large influences the method involved with assembling lastly the material and the resultant item.

**Space Consideration:** Sometimes, materials of various properties must be chosen on the grounds that the powers in play are high and there are restrictions with regards to space.

**Availability of Material:** Some materials might be scant or hard to come by. Then, at that point, the creator might need to pick the utilization of some other material which may not be a reasonable substitute for the planned material.

An Aqua Silencer essentially comprises of a punctured cylinder which is introduced at the exit of the fumes from the motor, which might have openings of variable distances across. This is done to isolate the gas particles of enormous extents to frame gas atoms of more modest breadth. Hypothetically, at least four arrangements of openings are made on the punctured cylinder by penetrating. The furthest edge of the cylinder is fixed by a fitting Lime water is put away inside the punctured cylinder, which artificially responds with the fumes coming from the motor. A little covering of initiated charcoal is given overall around the punctured cylinder utilizing an internal box which holds the charcoal set up and isolates the charcoal and lime water from the water in the Aqua Silencer. This unit is then positioned in a compartment in which water is filled to a specific level. A little opening is given on the top of the inward box which conveys the exhaust from it to the external utilizing a little measurement pipe. A U-curve of line is built toward the finish of punctured tube which serves as a non-return valve which forestalls the discharge of motor fumes or lime water once again into the motor.

### **III. LITERATURE SURVEY**

1. A parcel of exertion is being made to lessen the air contamination from petroleum and diesel motors and guidelines for discharge limits are likewise forced. Besides, advancements in petroleum and diesel motors, joined with upgrades in the vehicles, will make fuel utilization decrease of 40% or more later on vehicles. One such advancement is improvement of the silencer unit of a motor. This is where an Aqua Silencer becomes an integral factor.

2. 'Outflow is a term that is utilized to portray the entirety of undesired gases and particulates which are delivered high up or discharged by various sources some of models are CO, CO<sub>2</sub>, NOX, and Hydrocarbon and the primary commitment of air contamination comes from autos and modern motors delivering gases like carbon dioxide and not burnt.

3. **Mali, O., Shinde, 2018.** Research paper on Aqua Silencer. This paper focuses on fabricating aqua silencer to reduce emission gases from petrol engine. The results show that more than 50% reduction in each gas emission.

4. **Bharath, M.R., Gokulakrishna, 2018.** Design and reduction of carbon monoxide and NO<sub>x</sub> in petrol engine Aqua silencer. International Research Journal of Engineering and Technology (IRJET), 5, pp. 1443-1414. The experimental study provides us with the design and construction of an aqua silencer for petrol engine.

5. **Sangeetha M,ER.** Improved efficiency in IC engines using proposed design of aqua silencer. International journal of Ambient Energy. 2018 Oct 17:1-4. This paper deals with an updated design and model development of an aqua silencer tested to prove the improvement in the emission control and noise reduction.

#### FABRICATION MODEL WITH EXPERIMENT:



Fig 8:-Aqua Silencer Attached With Bike

#### Dimensions :-

- **Perforated tube :-** Diameter 63 mm , Length 600 mm , Material-GI
- **2<sup>nd</sup> Layer:-** Diameter 110 mm , Length 600 mm , Material-GI
- **Outer Layer:-** Diameter 165 mm , Length 600 mm , Material-GI
- **Non-Return valve :-** ¾ inches

#### Pro & Cons:-

At running of motor, there is no vibration, Easy beginning, Reduce commotion and contamination at more prominent level, Carbon is isolated and Cost is low.

Lime water should be filled once in a year, Weight is more compared to conventional silencer, Little more Space is required.

#### IV. CONCLUSION

- The aqua silencer is more effective in the reduction of emission gases from the engine exhaust using perforated tube, lime water and charcoal





- By using perforated tube, the back pressure will remain constant and the sound level is reduced.
- By using perforated tube, the fuel consumption remains same as conventional system.
- By using water as a medium the sound can be lowered and also by using activated charcoal in water, we can control the exhaust emission to a greater level.
- The water contamination is found to be negligible in aqua silencer.
- It is smokeless and pollution free emission equivalent to the conventional to the silencer. It can be also used both for two wheelers and four wheelers and also can be used in industries.

#### REFERENCES

- [1] Keval 1. Patel, Mr. Swastik R, Gajjar "Design And Development Of Aqua Silencer For Two Stroke Petrol Engine" IJRST-International Journal for Innovative Research in Science & Technology Vol. 1, Issue 1, June 2014 ISSN(online): 2349-6010.
- [2] Sharad R. Mahajan "Air Pollution from I.C. Engines & its Control" International Journal of Inventive Engineering and Sciences (IJIES), October 2013.
- [3] Yogesh V Morankar, Prof. M. R. Khodke, "Noise Reduction of A Diesel Engine: A Review," International Journal of Engineering Research & Technology (IJERT) ISSN: 2278-0181, Vol. 3 Issue 5, May-2014.
- [4] S.. Patil Snehal S., Nandrekar Amruta A., Abhijeet S. Kabule, "Use Of Aqueous Ammonia In Silencer For Removal Of Co<sub>2</sub>, So<sub>2</sub> And Nox From Exhaust Gases Of I.C. Engines" RawaleSudarshan International Journal of Engineering Science and Innovative Technology (IJESIT) Volume 2, Issue 5, September 20.
- [5] Patel Praful M, Gajjar Swastik R., "A Literature Review On Design And Development Of Industrial Generator Silencer" UJSRD - International Journal for Scientific Research & Development) Vol. 3, Issue 01, 2015
- [6] Juhi Sharaf, " Exhaust Emissions and Its Control Technology for an Internal Combustion Engine" International Journal of Engineering Research and Applications, Vol. 3, Issue 4, Jul-Aug 2013.
- [7] Mankhiar Ajay B, Sindhu LS, G. Sasikala, "An Advancement to Reduce Pollution Effectively by Using Ti Nanotubes in Aqua silencer" International Journal of Engineering Sciences & Research Technology.
- [8] Abdul Rehman, Surya Yadav, Amansaxena, "Reviewed Of Noise Control in IC Engine" International Journal of Scientific Research Engineering & Technology (USRET), Volume 3, Issue 8, November 2014.
- [9] AQUA SILENCER by Nitin. V. Patil ISSN:-2394- 1537 Vol no 5. Issue no 3 march 2016.
- [10] Gupta MS, Bhargava D S and Varshney B S 1987 Removal of chromium through adsorption on saw
- [11] FABRICATION & ANALYSIS OF AN AQUA SILENCER By Harshal S. Khairnar ISBN: 978-81-932074-6-8 20 march 2016



**Impact Factor: 8.118**



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