

Modification and Performance Analysis of Aqua Silencer

Axay Panchal¹, Vastu Panchal², Swapnil Singh³, Shivam Thakur⁴, Sampan Shukla⁵, Chetan Patel⁶

^{1,2,3,4,5}Student, Dept. of Mechanical Engineering, Shroff S.R. Rotary Institute of Chemical Technology, Gujarat, India

⁶Professor, Dept. of Mechanical Engineering, Shroff S.R. Rotary Institute of Chemical Technology, Gujarat, India

Abstract - Air pollution is a major concern of new civilized world, which has a serious toxicological impact on human health and the environment. It has a number of different emission sources, but motor vehicles and industrial processes contribute the major part of air pollution. According to the World Health Organization, the main pollutants contribute by automobile are carbon monoxide (CO), unburned hydrocarbon (UBHC), oxides of nitrogen (NO_x) and Lead. Automobiles are not the only sources of air pollution, other sources such as electric power generating stations, industrial and domestic fuel consumption, refuse burning, industrial processing etc. also contribute heavily to contamination of our environment so it is imperative that serious attempts should be made to conserve of our environment from degradation. A modified Aqua Silencer is an attempt, in this direction, it is mainly dealing with control of emission and noise. A Modified Aqua Silencer is fitted to the exhaust of the engine. Sound produced under water is less hearable than it produced in atmosphere. This mainly because of small sprockets in water molecules, which lowers its amplitude thus, lowers the sound level. Because of this property water is used in this silencer and hence its name AQUA SILENCER. The noise and smoke level are considerably less than the conventional silencer, it is cheaper, no need of catalytic converter and easy to install.

Key Words: Aqua Silencer, Emission control, Noise Pollution, Charcoal, Charcoal water, Air Pollution

1. INTRODUCTION

Diesel engines are playing a major role in Road and sea transport, Mining, Agriculture, and many other industries. Considering the available fuel resources and the present technological development, Diesel fuel is evidently indispensable. In normal, the utilization of fuel is an index for finding out the economic strength of any country. In

spite, we cannot avoid the harmful effects of the large mass of the burnt gases, which destroy the purity of our environment every day. It is especially so, in most mature countries like EUROPE and USA. While, constant research is going on to reduce the toxic content of diesel exhaust, the diesel power packs find the ever-increasing applications and demand. This project is an attempt to reduce the toxic content of diesel exhaust, before it is emitted to the atmosphere. This system can be safely used for road transport like commercial vehicles and travelling vehicles. For achieving this toxic gas are to be reduced to acceptable limits before they are emitted out of this atmosphere, which otherwise will be hazardous and prone to accidents and

major problem is health of human because with the help of Hazardous exhaust gases breathing problem is occur so due to this respiratory diseases and damage to reproductive organs.

1.1 Reduction of abnoxious exhaust particulates

The principle of reduction of Abnoxious exhaust particulates is the absorption of the Abnormal gases from exhaust of the engine. In this the charcoal water and layer of the activated charcoal is reducing the abnoxious exhaust particulates. In which CO % is decrease up to greater level with the help of modified Aqua Silencer. And CO₂ and NO_x are reducing up to some level. In diesel engine HSU % is reduce with the help of Modified Aqua Silencer.

1.2 Measurement of exhaust gas content analysis and control

For measuring the contents of the exhaust gas, provisions are made to take samples between engine outlet and scrubber inlet and after the scrubber outlet before the gases are let-out to the atmosphere. These sampling points enable us to measure the exhaust gas content before and after scrubbing. The difference is evaluated and effective control is initiated. The samples are analyzed by using an oats apparatus of the system.

2. WORKING OF MODIFIED AQUA SILENCER

Basically, a Modified Aqua Silencer include a mild steel perforated tube which is installed at the end of the exhaust pipe. The mild steel perforated tube may have holes of different diameters. The very purpose of providing different diameter hole is to break up gas mass to form smaller gas bubbles the perforated tube of different diameters. Generally, 3 sets of holes are drilled on the perforated tube 5mm, 7.5mm and 10mm. The other end of the perforated tube is closed by plug. Perforated tube be composed of charcoal water inside it which chemically reacts with exhaust gas from the engine. Around the circumference of the perforated tube a layer of activated charcoal is provided and further a metallic mesh covers it. The whole unit is then placed in a water container. A small opening is provided at the end of the container to remove the exhaust gases. A non-return valve is provided at the end of perforated tube which is used for preventing reverse flow of exhaust gases and charcoal water. As the exhaust gases enter in to the modified Aqua Silencer, the perforated tube converts high mass bubbles in to low mass bubbles after that they come in to

contact with charcoal water they chemically react with it and pass through the pass-through charcoal layer which again purify the gases. It is highly porous and posse extra free valences so it has high absorption capacity. Since the charcoal layer is covered with outer shell which is filled with water. Sound produced under water is less hearable than it produced in atmosphere. This is mainly because of small sprockets in water molecules, which lowers its amplitude thus, lowers the sound level hence modified Aqua Silencer reduces noise and pollution up to greater level.

Table -1: Result Comparison

Gas content	Conventional Silencer	Aqua Silencer
CO (% of volume)	7.04	0.018
HC (PPM of volume)	1626	4
CO ₂ (% of volume)	5.36	3.27
O ₂ (% of volume)	14.59	15.87



Fig -1: Perforated Tube



Fig -2: Inner view of modified Aqua Silencer

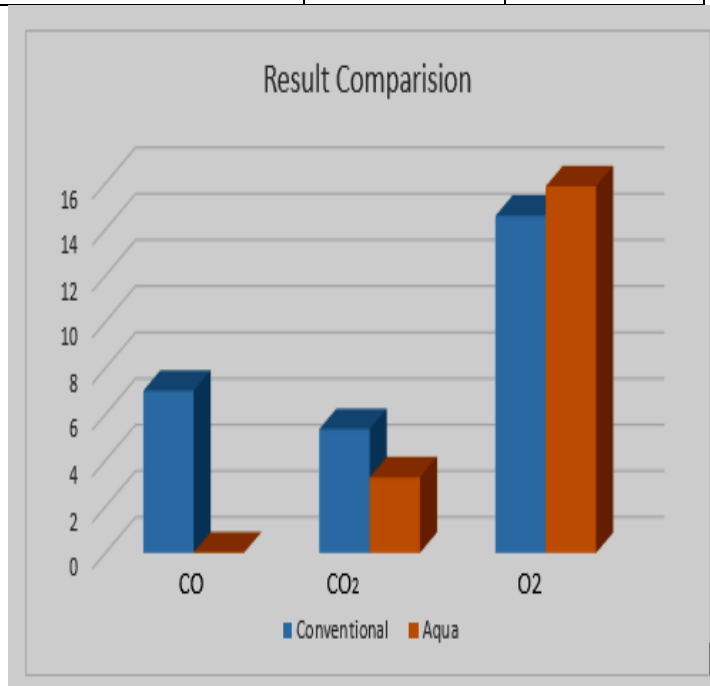


Chart -1: Result Comparison

The Above Graph Shows how % of volume as well as PPM of volume is reduced by means of Modified Aqua Silencer. Consequence of this it can help to reduce emission.



Fig -3: Modified Aqua Silencer

In modification of the Aqua Silencer we modify the design of the outer shell and perforated tube dimension. Then we replace the Lime water to Charcoal water. The test setup on silencer of diesel engine.

Measurement of emission: - The task of the exhaust gas sampling system is to provide a sample of gas from the vehicle tail pipe or from the engine exhaust manifold to the analyzers. The sample must be uniform, representative of the product analyzed, and must correspond to the actual emission from the engine as tested over the driving cycle.

2.1 Advantages of Modified Aqua Silencer

1. No vibration occurs when the engine is running.
2. Starting of the engine is easy.
3. Control emission and noise up to greater level.
4. Carbon is dispatch.
5. Easy to understand the working.
6. The water contamination is found to be negligible in Aqua Silencer.
7. It is smokeless and pollution free emission equivalent to the conventional to the silencer.

3. CONCLUSION

We predicting that 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.

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