International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 06 Issue: 03 | Mar 2019 www.irjet.net p-ISSN: 2395-0072

Exhaust Emission Controller System

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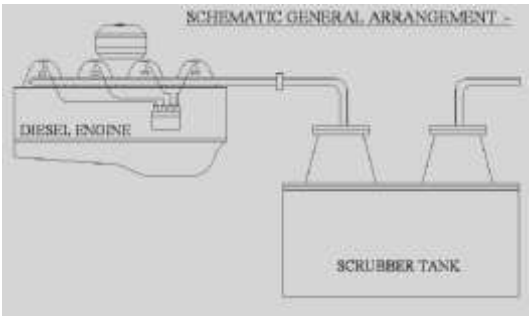
ABSTRACT *- In India two wheeler plays a major role in transportation. Most of the two wheeler engines are the petrol engine. The petrol and diesel plays a vital role in the global warming. We use Emission control to reduce the emission from the vehicle and also to reduce the noise from the vehicle. By using activated charcoal, perforated tube and outer shell the emission controller is constructed. This emission controller is connected to the exhaust pipe of the engine. The activated charcoal filters the harmful gases such as sulphur oxide and nitrogen oxide from the engine. The sound produced from the lime water is less when compared to the normal one. This is mainly because of the presence of the sprocket in the water molecules, which lower its amplitude thus reduce the noise level. When the exhaust controller is being tested in the four-stroke engine the pollution and the noise thus produced from the emission controller is less compared to the normal silencer. The main pollutant from the vehicle are carbon Monoxide(co), unburnt hydrocarbon(HC),oxide of nitrogen(NOx),and lead etc. Other sources such as electrical power, industrial and domestic fuel thus also produce pollution can be controlled by this emission controller.*

Keywords: *Emission controller, perforated tube, Activated charcoal, outer shell, sulphur, oxide of nitrogen, noise.*

Basically perforated tube which is connected to the end of the exhaust pipe in Emission Controller. The perforated tube has different diameter. Purpose of providing different diameter holes is to convert high mass bubble to low mass bubbles. Generally 3 set holes are drilled on the perforated tube, one end of perforated tube is closed. The activated charcoal layer provided on circumference of perforated tube. The whole unit is then full immersed in a lime water container.



A small opening is at the top of the container to pass the exhaust gases in atmosphere and a drain plug is provided at the bottom of the container for periodically cleaning of container.

Also filler plugs is at the top of the container for filling lime water. At the inlet of the exhaust pipe a non-return value is provided which prevents the back flow of lime water.

1. When exhaust gases enter into the Emission Controller, the perforated tube split high mass bubbles in low mass bubbles after that they pass through charcoal layer which is parallel over the perforated tube again purify the exhaust gases.

2. It is highly porous and posses extra free valences to its high absorption capacity.

3. After passing gases over the charcoal layer gases dissolve into lime water and finally the exhaust gases escape through the opening in to the atmosphere.

I. EFFECT OF DISSOLVED GASES ON LIME WATER

The lime water is good absorbing medium. In emission controller the gases are passed through perforated tube which is dipped in lime water. When these gases dissolved in water they for, acids, carbonates, bicarbonates etc.

1. **Action of dissolved SO2** When SOx is mixed in water, it form SO2,SO3,H2SO4i.e, sulfur Acid(H2SO3),it forms Hydrogen Sulphur which causes carious egg smell,acidify and corission of metal.

2. **Action of dissolved Co2** The dissolved carbon dioxide forms bicarbonate at lower PH and Carbonate at higher PH. Calcium carbonate will precipitate when carbon dioxide present in exhaust gas and in contact with lime water.

3. **Effect of dissolved NOx** The NOx is a product of combustion of oxide of nitrogen. absorb to a larger exent by water.

Reactions

- The SO2gas is removed from the first gases forming calcium sulphate.

Ca(OH)+SO2=caSO3+H2o

- Neutralizes any acid present in water.

2HCL+CA(OH)2.....CACL2+2h2h2S04+CA(OH)2……CAsO4+2 H2O

- Precipitates bicarbonate as calcium carbonate

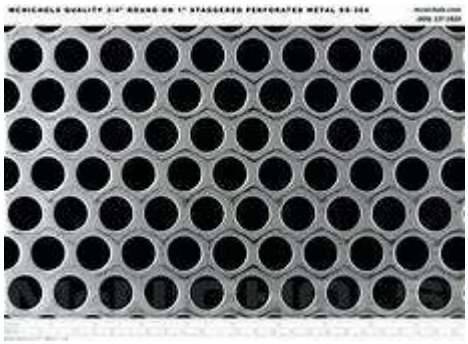
$CO_2+CA(OH)_2$….$CACO_3+2H_2O$

- Converts bicarbonate ions into carbonates.

$NaHCO_3+Ca(OH)$……..$CaCo_3+H_2O+Na_2CO_3$

COMPONENTS AND EXPLANATION

Perforated tube



The perforated tube has number of holes of different diameter on its circumference. It is used to convert the high mass bubbles to low mass bubbles. The charcoal layer is pasted over the perforated tube with the help of the metallic mesh.

Charcoal Layer

The charcoal layer has more absorbing capacity because it has more surface area and also it has more porosity. This charcoal is called as Activated Charcoal. It is manufactured by heating the charcoal above 1450 'c for several hours in a burner. Its surface area gets increased.

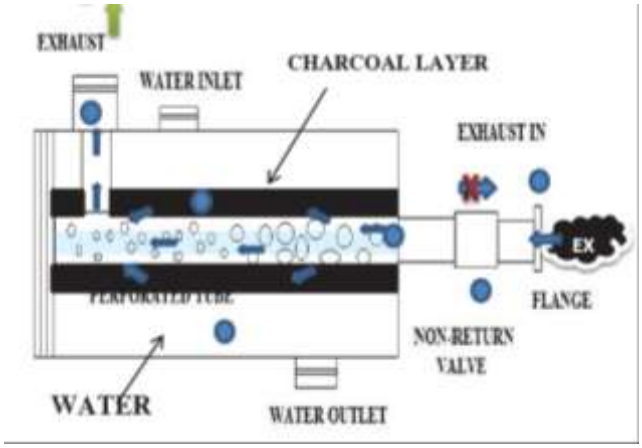
Outer shell

The whole setup was kept inside the outer shell. It is made up of stainless steel. The water inlet, outlet and exhaust tube was provided in the shell itself.

Bend pipe

Bend pipe is used for connect emission controller and the exhaust chamber properly.

WORKING



The exhaust gases passed into the emission controller, the perforated tube converts high mass gas bubbles into low mass gas bubbles after that they come into contact with lime water they chemically react with lime water and pass through the charcoal layer which again purify the gases. It is porosity remains constant in water. Since the charcoal layer is convered with metallic mesh which is filled with the lime water.

Sound produced under water is less herable than its produced in conventional silencer. This is mainly because of water molecules where water has good damping property, which lower its amplitude thus, lower the sound level hence the emission controller controlls the pollutant from the vehicle and also the noise from the vehicle.

MERITS

1. Control emission and noise in greater level.
2. Detoxification
3. CO reduces 60% to 70%.
4. No vibration when the engine is running.
5. Start of the Engine easy.
6. Carbon is precipitated.
7. Low Cost.
8. Sound is Reduced.

DEMERITS

1) Lime water filling is required frequently.
2) It is expensive than conventional silencer.
3) Silencer weight is more than the normal silencer.
4) More space is required.

5) Aqua silencer is big in size.

APPLICATIONS

1. It is used in marine and boats.
2. It is applicable for DG sets and DG machine.
3. It is used in industry sector.
4. It is also used in automobile sector.

RESULTS

CONCLUSION

1. Emission are reduced upto the greater level.
2. Size of silencer is reduced and can be used for two wheeler.

Future Scope

I. It can be used in the two wheeler and as well as in the heavy duty vehicles.

It can be useful in industrial application also with slite modification to it.

EMISSION TEST REPORT

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