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

# A REVIEW OF THE AUTOMOBILE INDUSTRIES WASTE WATER TREATMENT METHODOLOGIES

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**Abstract:-** Nowadays many water resources are polluted by waste water from chemical industry, pharmaceutical industry, automobile industry, textile industry, sugar industry, paper, beverage industry including household and agricultural waste and fertilizers used. It is very necessary fact that human should treat the effluent properly before sending in river. Automobile industry represents a many of industries in operation and processes as diverse as its product. Hence effluents coming from Automobile industries vary from industry to industry. Thus, it is almost impossible to describe a typical Automobile effluent because of such diversity. Considering the above stated implications an attempt has been made in the present project to evaluate the efficiency of ETP. Automobile industry waste water contain oil and grease , high TDS, non- constant PH ,High TSS Paint impurities, Coolant,sulphate,phosphate paint ,high Chloride concentration Turbid and pungent smell water. The automobile industry effluents which are discharged are treated with various physical and chemical treatments such as coagulation, flocculation, ozonation, PH correction, sedimentation and biological treatment for the removal of nitrogen, phosphorous, organics and metal traces. Although many research papers have been reported on wastewater pollution control studies, but a very few research work is carried out for treatment of wastewater of automobile industries, especially in reference to development of design of industrial effluent Treatment Plants (ETP) system. Another beneficial aspect of this research work will be recycling, reuse of water and sludge from automobile industry. Bajaj Auto Ltd is one of the leading industry in Aurangabad which Recycle and Reuse water with zero chemical and polluted water discharge.

**Key Words**: Effluent, Automobile, Treatment, Technology R.O.Plant, Bioreactors, Activated sludge

## INTRODUCTION

Water is the main constituent which is used in all type of the Industries and Domestic purposes. Water is used for different processes in the industries. It may be used for painting, Dying, cooling, washing, dilution, formation and condensing the steam. But all water used in the different industry is not totally consumed. Here Bajaj Auto Limited Aurangabad branch is using water from Jayakwadi Dam. Generally, almost all the industries generate waste water that needs attention. Water use in industry is a double-edged sword. On one hand it puts immense pressure on local water resources. On the other, wastewater discharged from the industry pollutes the local environment. Water is required, often in large volumes, by industries as process inputs in most industries. In other cases, like food and beverage and chloro-alkali industry, water is used as a raw material: turned into a manufactured product and exported out of the local water system. However, in most industries it is essentially used as input and mass and heat transfer media. In these industries a very small fraction of water is actually consumed and lost. Most of the water is actually meant for non-consumptive process uses and is ultimately discharged as Effluent. Sources of water for industry is River, dam lakes etc Nowadays river water is becoming polluted due to waste water discharge by industries and their carelessness and weak environmental laws and regulations. Bajaj Auto has played a very important role in environment field. There is no water pollution, soil pollution, noise pollution. There are three big water reservoirs to reduce load on dam water.

### Steps involved in process of treatment

The waste water is the primary and the most polluting component of the Automobile industry's effluent. The conventional techniques adopted to treat the wastewater are physical, chemical and biological methods. 1. Physical – Sedimentation (Clarification), screening, aeration, Filtration, Flotation and skimming, degasification, Equalization.

2. Chemical – Chlorination, Ozonation, Neutralization, Coagulation, Adsorption, Ion exchange

3. Biological a. Aerobic – Activated sludge treatment methods, Trickling filtration, oxidation, ponds, lagoons, aerobic digestion b. Anaerobic – Anaerobic digestion, septic tanks, Lagoons The treatment process can be sequenced as below:

I. Primary treatment – Removal of suspended solids, oil, grit etc.

II. Secondary treatment – Use of microorganisms in either aerobic or anaerobic condition for the reduction of the BOD, removal of color, oil and phenol.

III. Tertiary treatment – Use of electro dialysis, ion exchange and reverse osmosis for the final removal and purification of the wastewater

The Automobile industry effluents which are discharged are treated with various physical and chemical treatments such as coagulation, flocculation, ozonation and biological treatment for the removal of nitrogen, phosphorous, organics and metal traces. The disadvantages of the physic – chemical processes are the formation of sludge, disposal of sludge and the space needed. The disadvantages of the biological processes are the presence of the toxic heavy metals which hamper the growth of microorganisms, most of the dye stuff used are no biodegradable in nature and the time requirement for the treatment is more. Automobile industry effluent contains chlorides, Paint impurities which are used to give paint on two wheeler and three wheeler parts by robots, Mineral oil from Coolant impurities which is used in machine shop. If coolant discharged in water it enhances COD of effluent. Automobile industry consist two treatment plants one ETP and other CTP.As compared with other industries parameters of automobile effluent is low and somewhat less organic and inorganic load is there.

Recently Pollution control board is very strict about the ETP outlet water parameters. Health of environment is very important for better health of human beings. In past most of industries were sending their effluent without treatment but now it is not possible. Every industry is treating water carefully. Bajaj Auto is a leading company which is investing lot money to treat water without discharging a single liter effluent outside.

**Necessity of ETP** –

- To clean industry effluent and recycle it for further use.
- To reduce the usage of fresh/potable water in Industries.
- To cut expenditure on water procurement.
- To meet the Standards for emission or discharge of environmental pollutants from various Industries set by the Government and avoid hefty penalties.
- To safeguard environment against pollution and contribute in sustainable development.

Flow chart of ETP in Automobile Industry.

**ETP Plant Operation-**

1) **Screen chamber**: Remove relatively large solids, plastic bags, and bottles to avoid abrasion of mechanical equipment's and clogging of hydraulic system.
2) **Sedimentation Tank**: This a large capacity Zigzag tank.In this tanks water is allowed to run slowly in zigzag direction so whatever the suspended matter of paint is present it will settle down and supernatant water will flow ahead which is less turbid than earlier.
3) **Collection tank**: The collection tank collects the effluent water from the sedimentation tank, stores and then pumps it to the equalization tank.
4) **Equalization tank**: The effluents have fluctuate concentrations at all the time; the pH will vary time to time. Effluents are stored in the equalization tank resulting in a homogenous mixing of effluents and helping in neutralization. Automobile industry Effluent has acidic PH sometimes alkaline. Lime is used to neutralized acidic PH .Mostly Lime is used because it is cheap than caustic soda . Continuous mixing also eliminates settling of solids within the equalization tank. Reduces SS, TSS.
5) **Flash mixer**: Coagulants were added to the effluents: Lime: (800-1000 ppm) To correct the pH upto 8-9
6) **Flocculation Tank**

   In the clarriflocculator the water is circulated continuously by adding polymer and stirred continuously. Overflowed water is taken out to the aeration tank. The solid particles and dissolved paint it will stick to polymer and it float on water and collected

separately and dried; this reduces SS, TSS. Flocculation provides slow mixing that leads to the formation of macro flocs, which then float out on the clarifier zone and turbid water is converted into clear water. The flock's i.e. primary sludge is sent into lamella clarifier.

7) **Lamella clarifier**
In this clarifier flocks are allowed to trap into screen bars and it is sent to sludge beds for drying.clear water passed to secondary tanks.

8) **Secondary treatment**
In this tank water will be free from turbidity having higher alkaline PH. Alkaline PH is neutralized by dosing dilute sulphuric acids. Nowadays hydrochloric acid is not used for neutralization.

9) **Biological treatment**
Neutralized water is allowed to pass into Bioreactors. Bioreactor tank contains Mycobacteria populations in large quantity. Which convert organic and inorganic chemicals into carbon dioxide and water in presence of Oxygen. All COD and BOD load is reduced in this tank. Bioreactors are the backbone of ETP.

10) **Clarifier**
The overflow water which is treated is allowed to come in bottom of clarifier. Along with water from bioreactor some population of bacteria will come in clarifier .That bacteria sludge is recirculated in Bioreactors again to maintain constant population. If sludge will increase in bioreactor tanks it can be taken to sludge bed for few minutes based on MLSS and Sludge Volume Index.

11) Post Aerator
The overflow water from clarifier is passed into post aerator .Here Dissolved oxygen level of treated water is increased at normal level. This water has normal range of PH, TDS, TSS, COD, BOD, Oil and Grease, phosphate, chlorides .all parameters are within Pollution control board.

Automobile industries have set up online PH meter on every tank like inlet, outlet tanks. There are online TDS, TSS, COD, BOD meters which record the parameters correctly and display on monitor of manager's computer. So need of chemist is very less for analysis .All instruments are calibrated monthly for more accuracy.

## 3. CONCLUSIONS

Automobile effluent inlet water parameters are not too much serious as compared to pharmaceutical, textile, sugar and chemical Industries. Treatment is easy. Field supervisor and chemists role is very important in the proper treatment.

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