PHARMACEUTICAL WASTE WATER TREATMENT - A REVIEW

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Abstract - Wastewater from Pharmaceutical industry is one to has complex individuality and is measured a brave for ecological engineers in stipulations of conduct as well as consumption. Before treatment and recycle, purpose of physicochemical limitation is an important means. Many unlike types of technique are introduced and adapted for the principle, but depend upon the water quality parameters. Pharmaceutical industry represent a series of industries with procedure and process as diverse as its invention. Waste water is generally evaluate in terms of temperature, pH, Total balanced solid (TSS), Biochemical oxygen demand (BOD), Chemical oxygen demand (COD), Oil & grease, chlorides and sulphates. This Project reviews a range of treatment methods for treat pharmaceutical waste water. These methods are generally categorized into biological, Ozonation and advanced oxidation processes. Regarding the new challenge coming with anthropogenic micro pollutant and future system, the ozonation can be an choice to solve these everyday jobs in particular in grouping with biological conduct. Ozone has the capability to oxidase and disinfect concurrently.

Keywords— Biological process, Advanced Oxidation Process, Ozonation process etc.

Introduction

Pharmaceutical manufacturers use wet for course operations, as well as for additional non-process purposes. However, the use and discharge practices and the characteristics of the wastewater will vary depending on the operation conduct at the facility. procedure water include any water that, during manufacturing or dispensation, comes into shortest contact with or results as of the use of any raw cloth or manufacture of an intermediate, finished invention, byproduct, or waste. Process wastewater includes water that was worn or formed during the effect, water used to hygienic process apparatus and doors, and Pump seal water. Non-process wastewater include noncontact cool water (e.g., used in heat exchangers), noncontact ancillary hose (e.g., boiler lowdown, bottle washing), sanitary wastewater, and wastewater on or after other sources (e.g., storm water).Pharmaceutical manufacturer generate process wastewater contain a variety of conservative parameters (e.g., BOD, COD, TSS, and pH) and other chemical constituent. It have also enclose very little to nil balanced solid materials. In these uniqueness, choice of treatment processes that are selected will usually include the chemical rainfall as the first step earlier than the wastewater is fed to the biological course. The element compound will be dissimilar in nature depending on the type of pharmaceutical goods being produced and as such binding or chelating agents are used to draw and lump together the contaminants to be uninvolved through floc formation.

India is a largest pharmaceutical producing nation. These pharmaceutical industry are singing an important role in the economic development of the India but the effluents at large produce a high amount of organic pollution in both aquatic and terrestrial ecosystems. They alter the physico-chemical characteristics of the receiving aquatic bodies and affect aquatic oral and fauna. Pharmaceutical factory effluent produces obnoxious odor and unlikable color when released into the environment without correct treatment. This wastewater is dropping the soil health. The life in effluent is highly diverse and consists of interact population of microorganisms and effluent fauna and their activities change physical, chemical and biological characteristics of effluent. It is too containing high level of toxicity, BOD, COD contain which is dangerous for the agriculture and aquaculture being. Hence the removal of this contain is important which is removed by the wastewater treatment.

Previous works

Ahmad Ashfaq et.al.(2014) researched that the pharmaceutical industry represents a range of industries with operation and processes as diverse as its product. Due to this the effluents coming from pharmaceutical industries vary from industry to industry. These methods are broadly categorized into physic chemical, biological and advanced oxidation processes. There are a number of promising new treatments including AOPs such as oxidation, ozonation, direct photolysis, TiO_2 photo catalysis, solar photo catalysis, Fenton reactions and ultrasonic irradiation.

Akmehmet Balcio Glu et.al,. (2004) invented that for the treatment of antibiotic formulation wastewater by ozonation, pH control is an important factor in order to obtain an effective treatment performance. The introduction of H_2O_2 did not enhance the treatment efficiency of the enrooxacin containing formulation wastewater. In the O_3/UV process, the contribution of UV light to the overall aromaticity removal and biodegradability enhancement was high. Consequently, ozonation and photolytic ozonazation processes seem to be promising methods for the pretreatment of antibiotic containing formulation wastewater.

Gome A. et. al.(2013) proposed that the biodegradability improvement of untreated wastewater and chemically and or biologically pretreated industrial wastewater has become popular recently because of stringent environmental regulations for safety. Biochemical oxygen demand (BOD) measures the biodegradability of wastewater but the extent of pollution can be better presented by considering the magnitude of chemical oxygen demand (COD). The study deals with the treatment of pharmaceutical industry wastewater by ozone. An attempt has been made to assess the biodegradability of the selected pharmaceutical wastewater sample. It is suggested that treatment under acidic condition at highest ozone concentration of 32.73 mg/lit for a treatment time of 8 min and for alkaline medium ozonation was found more suitable at highest ozonation current of 0.5 ampere and 30 mg/lit of O3 concentration.

M.Gandhirajan et. al. (2008) was described that the wastewater is treated in a biological treatment plant comprising of equalization, neutralization, settling, extended aeration type biological treatment, pressure sand filtration and activated carbon filtration followed by a recycling plant with reverse osmosis and forced circulation mechanical evaporator. The physiochemical followed by biological treatment effects partial reduction of BOD/COD ratio. However, the reverse osmosis system removes the pollutants to a considerable extent and brings down total dissolved solids, BOD and COD and makes the RO permeate for recycling.

R. V .Kavitha, et.al. (2012) was invented that the industries produces bulk drugs, antibiotics, pain killers, food additives, personal care products and others. It is important for the industry to develop its own wastewater treatment system before discharging the effluent in order to meet the Karnataka State Pollution control Board (KSPCB) standards. Reduction of pollutants in the wastewater down to permissible concentrations is necessary for the protection of ground water and the environment. The individual units are also performing well and their removal efficiencies are satisfactory. TSS removal efficiencies for the primary clarifiersers is 97.8 %,The maximum BOD removal efficiency achieved was 76% & TDS of 45.31% using reverse osmosis process, aerobic treatment showed 59% COD removal whereas anaerobic phase has poor TDS removal capacity (9%-12%)The overall performance of the effluent treatment plant was satisfactory. This treatment plant is high potential for BOD, TSS and TDS removal.

V.S. Priya et. al.(2014) is used the performance of an up flow submerged aerated biological filter (SABF), treating mixture of VOCs in pharmaceutical wastewater was evaluated. Methanol, acetone, dichloromethane, benzene and toluene were chosen as target pollutants. The effects of airflow rate, hydraulic retention time and organic loading rate on VOC emission were evaluated. Performance of the laboratory scale submerged aerated biological filter for the treatment of pharmaceutical wastewater was evaluated by varying its operational parameters. Overall 96% degradation in COD removal was achieved up to an organic loading of 17 kg/m3/d. Competition for the active site among VOCs, when present in higher concentration mainly affected the degradation of benzene and toluene at higher organic loading rate.

Muhammad Saleem et. al.(2007) was studied for the treatment of pharmaceutical wastewater and the objective of the research was to study the removal of color, Total Dissolved Solids (TDS), Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD) and turbidity bring them up to the allowable limits for reuse purposes. He used coagulation, flocculation, sedimentation, sand filtration by using activated carbon adsorption for the treatment. He found that the tested coagulants such as alum, ferric chloride, and ferrous sulphate are not much effective and requires high dosage for the removal of TSS, BOD, COD and turbidity. Alum was found to be more effective among all the tested coagulants and reduce TSS, BOD, COD and turbidity 79.6%, 34.8, 48.6% and 69.2% respectively. Sand filtration further reduced the studied parameters 97.7%, 95.7%, 93.9% and 76.9% respectively.

Conclusion

From literature review it was observed that the combined process of the biological treatment and advanced oxidation process is the more effective for the treatment of wastewater. In this process there is removal of the COD and BOD efficiency is greater than 95%. Ozone is unstable because of that thing it is generate on the site. Ozone is very effective at destroying v ruses and bacteria and decomposes back to oxygen rapidly without leaving harmful by products. Ozone is also removing the odor and turbidity. Ozone is not very economical due to high energy costs.

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