

Sewage Treatment Methodology-A Review

Hemath Naveen K.S^{#1}, Hema Priya.M^{*2}, Swathi.S.D^{#3}, Vinothan K.G^{#4}

Assistant Professor¹, B.E(Final Year students)^{2,3} & Associate Professor⁴

Department of Civil Engineering, S.K.P. Institute of Technology, Tiruvannamalai-606611, Tamilnadu. India.

Abstract The paper presents the various study about the sewage treatment and efficiency of cleaning process of various waste water. In our study we discussed the methodology to treat sewage by various experimental studies. They are presented in the different treatment methods of waste water in order to find the best conditions and parameter treatment process.

Keywords : Sewage, Treatment, coagulation.

I. INTRODUCTION

Sewage is the term used for wastewater that often contains feces, urine and laundry waste. It also carried in solution or suspension, that is intended to be removed from a community. Also known as domestic and industrial waste water, It is more than 99.9% liquid waste and 0.1% solid waste is characterized by volume or rate of flow, physical conditions, chemical and toxic constituents, and its bacteriologic status. It consists mostly of greywater, black water, soaps, detergents and toilet paper and also contains surface runoff depends on the sewer system. It is generated by residential, institutional, commercial and industrial establishments. It includes household waste liquid from toilet, baths, showers, kitchens and sinks draining into sewers. In many areas, sewage also includes liquid waste from industry and commercial places. Sewage is composed of many materials that are broken down into three general areas. These areas are the physical, chemical, and biological characteristics of waste water. The physical characteristics of waste water includes those items that can be detected using physical senses. They are temperature, colour, odour, and solids. The chemical characteristics of sewage helps in indicates the stage of sewage decomposition, its strength, extent and type of treatment required for making its safe, they includes solids are present may be four types suspended solids, dissolved solids, colloidal solids, settleable solids, pH, nitrogen contents, chloride content, DO. The biological characteristics of sewage contains many microorganisms like bacteria, algae, fungi, protozoa, etc.. Bacteria being most predominant (1) The resulting water pollution causes the quality of the water to deteriorate and affects ecosystems. Pollutants can also seep down and effect of ground water deposits. Sewage and industrial wastes are discharged into the rivers. Because of our environment and for our own health. There are lot of good reasons why keeping our water clean is an important priority. The major aim of waste water

treatment is to be remove as much of the suspended solids as possible before the remaining water called effluent is discharged back to the environment. As solids materials decays, it uses up oxygen, which is needed by the plants and animals living in the water. Treatment and safe disposal of waste water is necessary and this will facilitate protection of environment and environmental conservation, because the waste water collected from cities and towns must ultimately be returned to receive Water or to land. The individual treatment method are classified into physical, chemical and biological treatment unit operation. The physical unit operation in which the application of physical forces namely screening, mixing, flocculation, sedimentation, floatation and filtration. The chemical unit operation in which removal of contaminants is brought by addition of chemicals, the method such as precipitation, gas transfer, adsorption, and disinfection. The biological method in which the removal of contaminants is brought about by biological activity. Our studies deals about only the literature of review of various experiments conducted by different persons, related to the field.

II. TREATMENT METHODS

2.1. Biological Treatment Of Waste Water Using Activated Sludge Process And Sequential Batch Reactor Process

Sewage is 99% water carrying domestic Wastes originating in kitchen, bathing, laundry, urine and night soil. The objective of sewage treatment is to meet the relevant discharge standards given by Central pollution control Board. The treatment plant normally consist of two type aerobic And anaerobic bacteria using to treat the sewage waters. Treatment of sewage is possible by using various process like oxidation ponds, trickling filter, USAB process, ASP, SBR. out these process ASP and SBR are commonly used most of the places. ASP has become the most extensively employed secondary unit process. SBR treatment process is characterized by a repeated treatment cycle consisting of a series of sequential process phases; filling, reaction, setting and decanting (3) ASP Process commonly used for municipal waste water treatment. the removal of BOD is done by biological process. This process is an aerobic process and takes Place in aeration tank, which water aerated by oxygen by creating good conditions bacteria will grow fast. It also used to treat the water. SBR

treatment process indicates that it is intermittent process. In this process five stages employed to treat the sewage they are filling, reaction, settling, decanting, and idle. It also used for biological treatment to remove organic matter, nitrogen and phosphorous. This process solid are separated from the reactor during the decanting phases (4)modified ludzck ettinger process using secondary clarifier process. Activated sludge is removed and to achieve higher level of nitrates removal from wastewater.(4). In ASP domestic waste water of all type is treated, but only for removal of COD, BOD, TSS, Fecal coliforms and upgradation of PH and DO, TKN and phosphate up to some extent by using some tertiary treatment. (5).SBR is well suited for tannery waste water for effective COD and N removal(6). The SBR System has a higher ability to remove the total nitrogen TKN concentration than AS system under all case of operation. The average TKN removal TKN removal for SBR and AS system is equal to 85% and 80% the average NH₃+ removal for SBR and AS system is equal to 98% and 90%(5).the performance of ASP is removal efficiency of BOD 94.6%and TSS is 93.72% (7).The Activated Sludge plant consisting higher rate of efficiency among all the system. The RBC process was found to be an approximate. 30%and 50% more efficient process than AS (8).The main advantages of Activated Sludge Process decreasing the number of operating cycle in intermittently decanted extended aeration treatment system. The cost can be reduced by 3%. It can be minimized by 12% by using a smaller capacity of air blower (9). In SBR system ,greater operational flexibility and easier and more accurate sampling and determination of mass balance, simple operation and low cost, lesser area required (10). The treatment of sewage has been a challenge through the years due to varying the raw water characteristics. SBR system has oxygen dissolving capacity higher than ASP. The removal efficiency of SBR is greater than ASP with less cost and space

2.2Performance Of The Modified Multi Media Filler For Domestic Waste Water Treatment

Waste water is affected in quality by anthropogenic influence. It comprises liquid waste discharged by domestic residence, commercial properties, industries or agriculture. Municipal waste water that contains a broad spectrum of contaminants resulting from the mixing of waste water from different sources. The branch of waste water engineering is the part of environmental engineering. Their ultimate goal of waste water engineering is the protection of public health. When the un-treated waste water allowed to go septic, that leads to nuisance condition including the production of malodorous gases. It contains nutrients which can stimulate the growth of aquatic plants and may contain toxic compound. For these reasons, the nuisance free removal of waste water sources of

generation followed by treatment reuse or disposal in environment is necessary to public health environment. It contains the low dissolved oxygen concentration on aquatic waste water treatment engineers mainly concentrated on the removal of pollutant that deplete the DO in receiving water. Biological treatment is the most important process. The investment and operation cost of biological treatment over other treatment methods. The combined treatment of waste water in agriculture field it leads to more risk. Segregation of waste water facilities treatment and reduced risk. It also used to treatment methods for filtration. Roughing filter can be used to polish waste water why because, this is more accurate and efficient method for over other filtration methods. The various filtration treatments are available for waste water and various parameter are found out. In this process is presented by(12). This mainly concentrated in design concept and process capabilities for roughing filters. the filter medium included broken burn bricks, charcoal and coconut fibre It also investigate removal of COD, BOD, turbidity and colour by using vertical up flow filtration technique. This study was conducted by sand, gravel, clay and coal combustion by products has been used as filter materials for phosphorous reduction in waste water. The materials burnt bricks, sand, gravel, clay have been proved to more efficient filter medium in improving the quality of BOD and phosphorous. Multi media filter is recently development technology for filtration. This technology is environmental friendly and cost effective. It application to small scale system

2.3.Coagulation Performance Evaluation Of Natural And Synthetic Coagulation In Waste Water Treatment

The main objectives of case study is total solids, TDS and flocs. the three type of methodology are using the waste water treatment. The application of natural materials for removing turbid water are amla seeds, tamarind shell, thulasi, papaya seeds dates seed etc., the process of natural coagulation methods about 500mg stock solution with help of jar test apparatus. Sample are collected from seven different position the pond. The coagulation performance in dye effluent sample method was collected from the tank and will exhibit the property of whole tank. The natural coagulation added will clog the agglomerates material and settling of agglomerates particles. The synthetic coagulants observed the settling of agglomerates Particles and after the initial precipitated occurred. The settled floc is taken by the scanning electron microscope and X-ray diffraction. The composition of the floc according to the SEM analysis are oxygen, ferrous and silicon. In dye effluent not perfectly removed in turbidity so, that waste water is introduce the column treatment. By this study the column treatment efficiency was studied to be 31.5%.

2.4.Waste Water Treatment by Coagulation and Flocculation

The suspended particle vary in sources, charge, particle size, shape and density. This factor influencing to identify the correct application of flocculation and coagulation. In early years of 2000 BC ,is used by almond to clarify water by the Egyptians. The Romans even through it was not specifically used for waste water treatment (15). The primary purpose of this process is removal of turbidity from the water. The chemical and electrical means water treatment was achieved by using coagulation as the most important physico-chemical process(16). The mechanism of Brownian movement in water, the negative charge surface are repeled to from a stable dispersed suspension was reported. (17). The coagulation fall into two categories of metals type. It is based on aluminium and iron. This paper concentrated only on aluminium based coagulation. It is relatively low cost and simple metal coagulants and simple route of application. Because the charge neutralization is not sufficient as well as excessive sludge will be produced. The agglomeration of colloidal particles bridge together to form micro flocs which turned into visible floc masses are reported in this paper (18). This paper contains treatment process of jar test apparatus used in various components are found this method. The observed study that alum was found to be more efficient than ferric chloride and ferrous sulphate for sample under experimental conditions. It is the best method of removal of turbidity. Alum was found to be more efficient with removal percentage of 98.9 under optimum conditions.

III.CONCLUSIONS

All the above studies deals with the removal of sewage by the effective methodology. It contains all the methods and some methods had higher removal efficiency, some lies are lower efficiency. The rate of efficiency are varying is too based on the type of the sewage is taken and treatment method are considered.

REFERENCES

- [1] Journal (water pollution control federation).vol 32, no 9 september 1960 pp 1005-1009.
- [2] Er.Devendra Dohare, Er. Mahesh kawale “ biological treatment of waste water using activated sludge process and sequential batch reactor process”. *Journal of engineering science and research technology*.
- [3] Mahvi A. H, ”sequencing batch reactor: a promising technology in waste water treatment”, *Iran journal of environmental health science engineering* , 2008, vol 5, no.2, pg 79-90.
- [4] CPHEEO “manual on sewerage and sewage treatment”. Second edition, the central public health and environmental engineering organization ministry of urban development, new delhi, may 2012.
- [5] Amr. Abdel kader “comparison study between sequencing batch reactor and conventional activated sludge by using simulation mathematical model “ thirteenth international water technology conference, IWTC 73, Hurghada, Egypt,2009.
- [6] Murat .s.et.al.,”sequencing batch reactor treatment of tannery waste water for carbon and nitrogen removal”.*water science and technology* vol 46 no 9,pp 219-227,2002.
- [7] Sundarakumar .k et al., “performance evaluation of waste water treatment plant”. *international journal of engineering science and technology*,vol 2(12),2010,7785-7796.
- [8] Steven Williams.E, et.al., “energy usage comparison between activated sludge treatment and rotating biological contactor treatment of municipal waste water”2006.
- [9] Fu Tang.E.et.al.,”a study of performance of waste water treatment system for small sites”, *world academy of science, engineering and technology*,2011,vol 5,pp-12-19.
- [10] Stricker Anne Emmanuelle et.al.,”sequencing batch reactor VS continuous flow process for pilot plant research on activated sludge”, *water environmental foundation*, vol 20,no-3,pp414-426,2006.
- [11] Gulhane M.L,Yadav P.G .”performance of modified multi-media filter for domestic waste water treatment”.
- [12] NK wontal .O (2010),” A comparision of horizontal roughing filters and vertical roughing filters in waste water treatment using gravel as a filter media”. *International journal of the physical science* vol 5(8), pg 1240-1247.
- [13] Senthil kumar.M, Gopal Krishnan G.V.T and Sivasankar .V” coagulation performance evaluation of natural and synthetic coagulants in waste water treatment”. *ARPJ Journal of engineering and applied science* vol 10, no 6, 2015.
- [14] Prakash N .B, vimala sockan, jayakaran.P” waste water treatment by coagulation and flocculation “. *international journal of engineering science and innovative technology* vol-3, issue 2, march 2014.
- [15] Bratby, J ., “coagulants, in coagulation and flocculation in water and waste water treatment, second ed., IWA publishing, London 50-68,2006.
- [16] Pernitsky, D. J, Edzwald J.K.” selection of alum and polyaluminium coagulation principles and application”, *journal of water supply: research and technology AQUA* 55(2):121-141,2006
- [17] Bache, D.H., Johnson, C., papavasiliopoulos E. MC Gilligan F.J.”sweep coagulation structures, mechanisms, and practices” *journal of water SRT-AQUA* 48(5), 201-210,1999.
- [18] Gregory, J., “particles in water : properties and processes”. London : IWA pub: Boca Raton, CRC press Taylor and francis 2006.