Performance Evaluation of West of Aahvaz Sewage Refinery (Chenaibeh)

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Abstract: Sewage treatment plants set up solely not able dismiss environmental concerns, to reach favorite environment’s standards rather, treatment plants operation shall continuously examining and evaluating. This study purpose is performance evaluation of west of Ahvaz sewage refinery and presenting solutions for its improvement and advancement. Sewage purification is common activated sludge process type, in this refinery. this study estimated daily samples during 12 months according with water and wastewater standards, samples took from Input and output sewage and parameters such as BOD5, COD, TSS and turbidity were measured and analyzed agree with water and sewage standards (standard method). Results show that average input load of TSS, COD, BOD5 and turbidity to refinery occurs at spring season at April and May and minimum input load occurs at February, July, August and September months, based on efficiency of pollutants elimination, maximum elimination efficiency relates to turbidity with 97.23% and minimum efficiency relates to TSS, with 70%. also, refinery output examined parameters values are less than allowed standard’s limit of discharged surface water. All parameters maximum elimination efficiency occurred at May and BOD5 and COD, minimum Elimination efficiency occurred at February, minimum elimination efficiency of TSS and turbidity happened at August. Finally, can say that west of Ahvaz sewage refinery output discharged water quality was according with discharge to surface water standard and refinery performance was favorite condition and decreasing efficiency at some year’s months related to seasonal weather changes, bulking occurrence and etc which can improve it by management and more supervision.

Key words: Sewage purification · Activated sludge · BOD5 · TSS · COD · Turbidity · Performance · Ahvaz sewage refinery

INTRODUCTION

Not favored effects on environment due to incorrect discharge of urban and industrial sewage are at levels that executing sewage projects at country’s urban and rural regions is essential and fundamental affair, the most important purposes of establishing sewage purification structures are, public health preservation, environment protection, water sources pollution prevention and reusing of purified sewage for agriculture and industry [1]. Nowadays urban and industrial sewages are being purified by several methods. One of these methods with more usage is activated sludge process [2]. In our country quantity of urban sewage refineries will be reached to 800 until 2021 which major of them will use activated sludge system for reasons like high efficiency, applicable in different climate conditions and need to less space [3]. Active sludge process constituents are known as sludge. main part of sludge is bacteria. Due to sludge aeration, present bacteria are being very active thus active sludge phrase is using for describing a process which bacterial mass has main role in sewage purification. Active sludge process able to do four vital actions in sewage purification, the actions are include 1) Oxidation decomposition of carbonic residues 2) Oxidation decomposition nitrogen Residues 3) tiny solids deletion 4) heavy metals deletion [4]. One of the most important problems of administering and exploitation in several active sludge systems relates to creating foam and sludge bulking which cause for decreasing efficiency.
About 40% of world’s sewage refineries which working by activated sludge are face with foam and bulking problems. Bulking is observed in two forms in refineries filament and non-filament, which disturb sewage refineries exploitation and administering. Of other problems in managing sewage refineries relates to foam forming. Foam creating has negative effect on Oxygen coefficient transfer in surface aeration and cause for suspended materials(suspended solids) escaping from secondary clarifier which finally disturb sewage refinery exploitation and managing. Of using parameters for sewage treatment evaluation can mention to dissolved oxygen dissolve value, turbidity, TSS, COD, BOD5, … [5-7]. If mentioned parameters in output of sewage refineries be more than allowed standard then the problem shall be follow and schemes planning to solve the problem. And if sewage refinery output be agree with standards, so The output shall be use for consumptions such as agriculture and discharge to surface waters By way of proper path, until this work help to solve water shortage crisis problem, partly[8]. The purpose of this study is examining performance of west of Ahvaz sewage treatment plant in pollutants elimination and comparing its output sewage with environment protection organization’s standard.

Fig. 1: Refinery Location in Provincial and Country Map

MATERIALS AND METHODS

Ahwaz city center of Khuzestan province located at southwest of Iran 48 degrees and 41 minutes of longitude and 31 degrees and 19 minutes of latitude. West of Ahvaz sewage refinery (Chenaibeh) situated on a land with 10 hectares area. Raw sewage (urban) enters to a pump station next to sewage refinery through two 1600 mm pipe lines then under pressure sewage enters the refinery. This refinery system is common activated sludge system exploitation and managing. (3) Of using parameters for sewage treatment evaluation can mention to dissolved oxygen dissolve value, turbidity, TSS, COD, BOD5, … [5-7]. If mentioned parameters in output of sewage refineries be more than allowed standard then the problem shall be follow and schemes planning to solve the problem. This refinery effluent pour into the Karoon river and for this reason refinery output is being compared with allowed standard of surface drained waters of environment protection organization, because the wastewater has proper quality, help to water shortage crisis for water sources management, also prevent environment from destruction, particularly water’s environment. Figure 1 shows the refinery location in provincial and country map and Figure 2 shows the refinery flow diagram.
For sewage quality and refinery efficiency specification, sampling from sewage entry and output wastewater was performed. Sampling was being performed daily, for one year. Samples from turbidity, BOD5, TSS, COD views were measured and analyzed by standard method. Obtained results for regarded parameters were compared with standard and wastewater quality was identified in every month. Finally, refinery incoming pollution load, output wastewater quality and purification efficiency were identified in compare with environment protection organization’s standard. One year of parameter elimination efficiency Results were compared with each other for purification process’s weakness and strength recognition at this refinery.

RESULTS AND DISCUSSION

Tests and sampling results were cited according with Table 1.

BOD5 test results according with graph number 3 show that maximum incoming pollution load To the refinery related to May with 268 mg/l and minimum incoming pollution load related to July with 131 mg/l.

According with graph number 4, BOD5 value in all sampling months is less than allowed pour to surface waters standard.

According with graph number 5, refinery maximum elimination efficiency is in May with 95.77% and minimum elimination efficiency is in February with 84%. Elimination efficiency decline in February result related to this month maintenance, vertical aeration pools were out of exploitation circuit and after maintenance BOD5 elimination efficiency decreased due to mixing fresh MILSS with non-aerobic sludge (became septic).

COD test results according with graph number 6 show that incoming pollution load To the refinery related to May with 361 mg/l and minimum incoming pollution load related to February with 220 mg/l.

According with graph number 7 output COD value is less than allowed pour to surface waters standard.

According with graph number 8 maximum elimination efficiency of refinery occurred in May with 93% and its minimum value related to February with 84.09%. Elimination efficiency decline cause in February related to this month maintenance, vertical aeration pools were out of exploitation circuit and after maintenance COD

<table>
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<tr>
<th>Date</th>
<th>BOD In put</th>
<th>BOD Out put</th>
<th>COD In put</th>
<th>COD Out put</th>
<th>TSS In put</th>
<th>TSS Out put</th>
<th>Turbidity Out put</th>
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Fig. 3: Comparing incoming BOD5 with output

Fig. 4: Comparing output BOD5 with allowed discharge to surface waters standard

Fig. 5: BOD5 elimination efficiency

Fig. 6: Comparing incoming COD with output

Fig. 7: Comparing output COD with allowed pour to surface waters standard
Elimination efficiency decreased due to mixing fresh MILSS with non-aerobic sludge (became septic).

According with graph number 9 turbidity test results show that maximum incoming pollution load to the refinery related to April with 138.2 mg/l value and minimum incoming pollution load to the refinery occurred in August with 83.5% value.

According with graph number 10 turbidity elimination efficiency in August (80%) was less than other months that its reasons related to temperature variations (striking shock to system due to high temperature), Floc escape at morning, temperature variations, incoming discharge variations and follow of it standing time variation and ..... in a way that during 5 days of this month output turbidity
Fig. 12: Comparing incoming and outgoing TSS

Fig. 13: Comparing incoming TSS with allowed standard of pour to surface waters

Fig. 14: TSS elimination efficiency

reached to 20 ntu. It is necessary to say that in all sampling months Output turbidity were lower than allowed pour to surface waters standard.

Maximum elimination efficiency of refinery occurred in May with 97.28 % and minimum Occurred in August with 80 %.

Graph number 12 shows that maximum incoming pollution load to the refinery from TSS view Occurred in May with 235 mg/l and minimum incoming pollution load happened in September With 90.65 mg/l.

According with graph number 13 TSS elimination efficiency value was minimum in compare with other months (70%).

Maximum efficiency of TSS elimination efficiency occurred in May with 90.42 % and minimum related to August with 70 %, its reasons related to temperature variations (striking shock to system due to high temperature ) floc escape at morning, temperature variations, incoming transition variations and follow of it standing time variation and …. it is necessary to say that in all sampling months output TSS were lower than allowed pour to surface waters standard.

CONCLUSIONS

Finally according with graph number 15 maximum elimination efficiency at the west of Ahvaz sewage refinery had related to turbidity elimination with 97.23 % and minimum elimination efficiency had related to TSS elimination with 70 %, during 12 months sampling period. Also, all parameters of refinery output samples were lower than allowed pour to surface waters standard. Results show that COD and BOD5 have direct relation with each other, TSS and turbidity have direct relation with each
other, too. As BOD5 and COD elimination efficiencies were maximum in May and were minimum in February. TSS and turbidity also, like each other have maximum elimination efficiencies in May and minimum in August. At the end can say that refinery efficiency operation has favorite status during 12 months. And reason of efficiency decline in some months related to seasonal weather changes, bulking occurrence, floc escape at morning, aeration variations, incoming transition variations and follow of it standing time variation and….

Recommendations:

- So this refinery aeration is being done in two forms surface (brush) and vertical, we suggest that necessary schemes prepare for dissolved oxygen sameness preservation increase until these two tanks outgoings deposit steadily and elimination efficiency become more.
- Calculating F/M ratio for identifying sludge age and reversing active sludge value to aeration or proper and on correct time ejection.
- Regulating oxygen value by changing standing time, increase and decrease aerators some and regulating incoming transition into aerators pools and … it should do so that dissolved oxygen always stay at 2-4 milligrams per liter limit. Because flocs become fragile and needle Form in more than 4 milligrams per liter oxygen and they become non-aerobic in less than
- Milligrams per liter oxygen, and this cause for increasing BOD5, TSS, COD, turbidity in refinery output thus purification performance efficiency will decrease.
- Standing time and dissolved oxygen shall be regulating, sludge reverse and sludge ejection
Doing timely and properly to prevent of bulking occurrence in system and Improving system efficiency.

- For reusing of refineries sludge surpluses in agricultural lands and …. decrease pathogenic rules consideration is necessary, therefore refineries responsible should try harder for these rules recognition and precise implementation.
- Decreasing standing time and aerators some at surface aeration (brush) in aerators pools for DO increasing in summer season at sufficient presenting of dissolved oxygen (2-4 mg/l) transforming ammonia to nitrate (nitrification) is being performed better also at winter season non-aerobic phase in aerators pools for lowering nitrate should be done.

REFERENCES


