

Performance evaluation of Shoushtar wastewater treatment plant (BOD5 and DO)

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Abstract: In this paper performance of wastewater treatment plant of Shoushtar city (in Khuzestan, Iran) for treatment of some parameters that is related to organic matter (BOD5 and DO) has been evaluated. In this plant, method of activated sludge process with extended aeration for treatment is used. In this study, after operation of the plant, the experimental data (BOD and DO in inlet and outlet, Discharge) were collected during two seasons. Results showed that BOD concentration of inlet flow has been reduced from 52% to 79% in winter season and 56% to 82% in autumn season. Also concentration of DO in outlet increased from 6.72 and 0.22 to 8.18 and 1.74 mg/l respectively.

Key words: Shushtar city; Wastewater treatment plant; BOD, DO

1. Introduction

Activated sludge is a biological process that utilizes microorganisms to convert organic and certain inorganic matter from wastewater into cell mass. The activated sludge is then separated from the liquid by clarification. The settled sludge is either returned (RAS) or wasted (WAS). Activated sludge is commonly used as a wastewater treatment process because it is an effective and versatile treatment process and capable of a high degree of treatment. According to (Agunwamba, 2001), the objectives of wastewater treatment include: reduction of biological oxygen demand (BOD), reduction of suspended solids (SS), destruction of pathogens and removal of nutrients, toxic compounds, non-biodegradable compounds and dissolved solids, (Viessman and Hammer, 1993). The activated sludge systems are designed in various forms, such as the conventional system; tapered, stepped, contract stabilization, extended aeration and high rate process systems (Pipes, 2005). The effluents discharged are found to have high organic and acidic content, which increases the BOD, COD and high organic load in the waste water contributively to dissolved carbohydrates, alcohols, suspended solids, yeast etc., which pollutes the water bodies considerably (Chaitanya Kumar et al., 2011). Ukpong (2013) were studied performance Evaluation of Activated Sludge Wastewater Treatment Plant (ASWTP) At QIT, Ibeno Local Government Area of Akwa Ibom State, Nigeria. The result showed that wastewater had no smell with clear colour at normal temperature and equilibrium pH value of 7. The TSS, TDS, total alkalinity reduction values were 4.68, 8.61 and 0% respectively. The DO value reduction was in the range of 40 to 45% and the BOD and COD values

reduced by 28 to 32.79% and 46.42 to 49.54%, respectively.

2. Material and methods



Fig. 1: Satellite picture of Shoushtar wastewater treatment plant

In this study, the wastewater was sampled from Shoushtar treatment plant in the specified dates. Picture (1) shows the satellite picture of Shoushtar wastewater treatment plant.

In Fig. 2 showed process of wastewater treatment in Shushtar wastewater treatment plant. These processes are including screen, grain tank, aeration, sedimentation and chlorination.

Wastewater treatment process of Shushtar city in Khuzestan, Iran, which is an extended aeration activated sludge wastewater treatment systems is but one of the best high flexibility and the ability to complete the biological treatment. Also available are well equipped laboratory specializing in the treatment and exploitation of Biotech efficiency of the treatment received.

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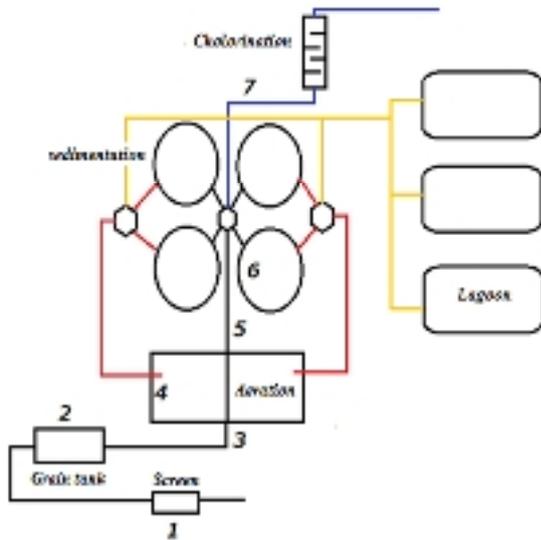


Fig. 2: Shushtar Treatment plant flow diagram

Sewage treatment of Shushtar now after the operation of the pumping station No. 13 was launched. Launched as unprofessional and lack of permanent laboratories in return sludge treatment, aeration and sludge discharge is being done as unscientific. In this research, samples of inlet and outlet of wastewater were collected from selected points for performance investigation of wastewater treatment plant of Shushtar city.

3. Results and discussion

Figs. 3 and 4 show the BOD changes in inlet in autumn and winter in 2013 year from Shushtar wastewater treatment plant. Figs. show that BOD concentration of inlet flow has been reduced from 52 to 79 %. These amounts are acceptable for operation of plant in winter season.

Table 1: Date of sampling and discharge data in autumn of 2013

Number in Fig.	1	2	3	4	5	6
Date	22/01/2014	06/02/2014	22/02/2014	06/03/2014	22/03/2014	06/04/2014
Discharge (m3/sec)	3550	3300	2700	2450	4100	3900

Table 2: Date of sampling and discharge data in winter of 2014

Number in Fig.	1	2	3	4	5	6
Date	22/01/2014	06/02/2014	22/02/2014	06/03/2014	22/03/2014	06/04/2014
Discharge (m3/sec)	3550	3300	2700	2450	4100	3900

These amounts about autumn are more than winter season, because these amounts are between 56 to 82 %. These different are because the higher average of temperature in autumn season compared to winter season. All biological and chemical reactions are affected by temperature.

Microorganism's growth and reaction rates are slow at cold temperatures and much faster at warmer temperatures. Most microorganisms do best under moderate temperatures (10-25°C). Aeration basin temperatures should be routinely measured and recorded.

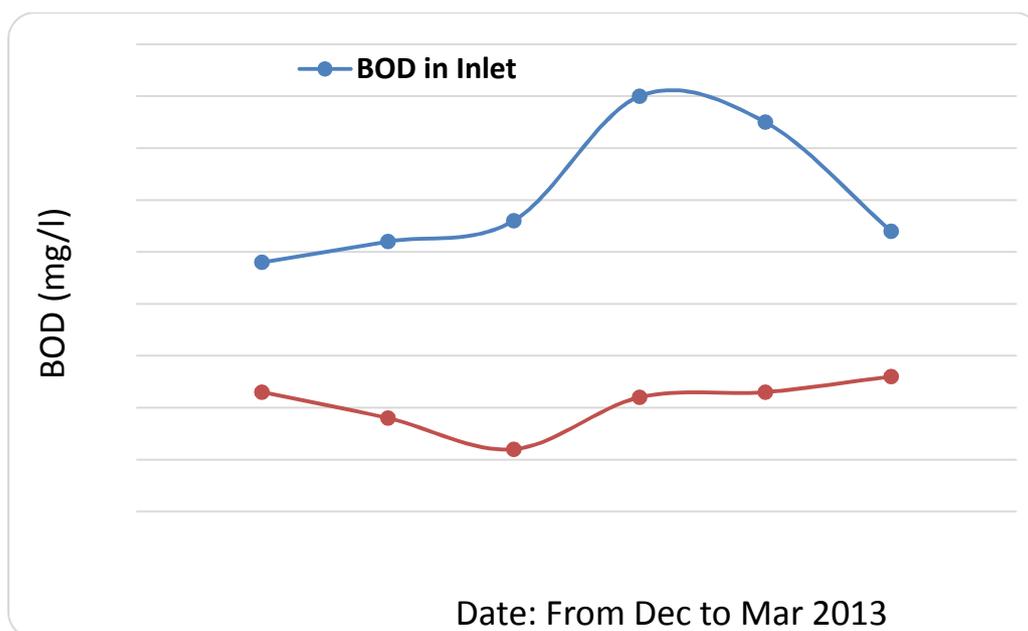


Fig. 3: BOD changes in inlet and outlet in winter season, 2013

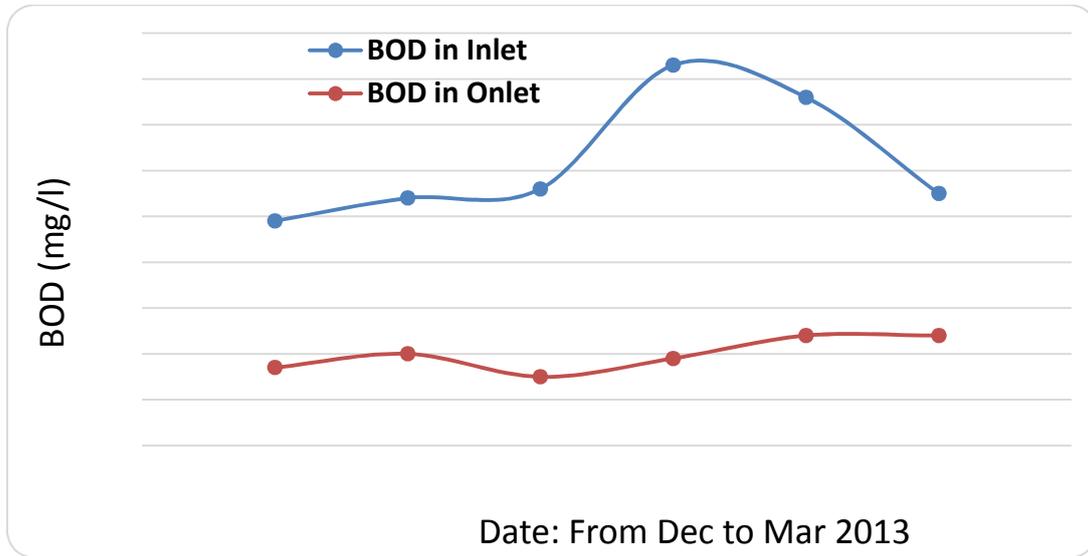


Fig. 4: BOD changes in inlet and outlet in autumn season, 2013

Figs 5 and 6 show the DO changes in inlet in autumn and winter in 2013 year from Shushtar wastewater treatment plant. Figs show that concentration of DO in outlet increased from 6.72 and 0.22 to 8.18 and 1.74 mg/l respectively. Results showed with decreasing in BOD concentration amount of DO concentration increased that this matter shows well performance of wastewater treatment plant.

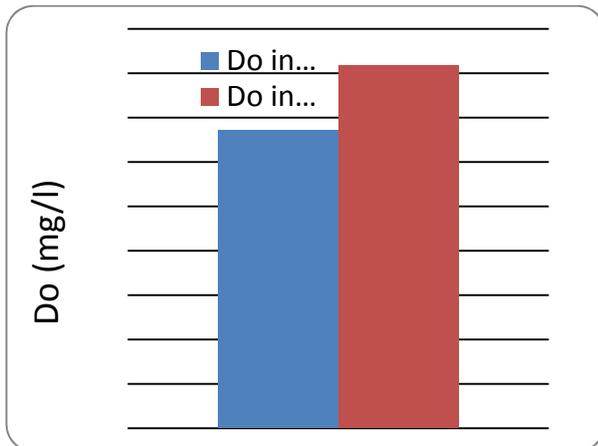


Fig. 5: Do changes in inlet and outlet in winter season, 2013

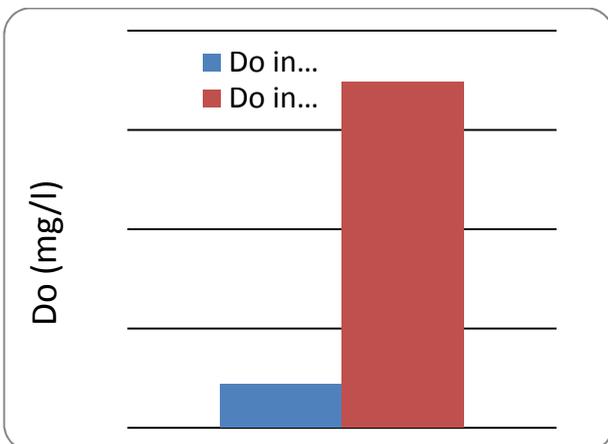


Fig. 6: Do changes in inlet and outlet in autumn season, 2013.

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