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ANALYSIS OF SINA RIVER WATER IN AHMEDNAGAR CITY

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Abstract:- The condition of Sina River in the Ahmednagar city is very bad and very polluted by industial as well as commercial & residential waste water. To clean the River we studied the factors which affects the quality of Sina River water. In the bank of river lot of encroachment causing a very short stream path and during rainy season the adjoining residential area and roads get flooded. To tackle all these problems & to make pollution free Sina we have to take some initiatives for that, rebirth of sina is essential. In this project we have analised and studied all the aspects which ae contributing pollution to river.

We have conducted some lab test to find the characteristics of water e.g. BOD, COD, DO, pH, Turbidity etc & also we have studied & then suggested the methods which will be helpful to remove the over burden of sina river with its bank to get clear & sparkling water of Sina.

1. Introduction :-

Sina River is a one of larger tributary of the Bhima River which originate near Ahmednagar city at Sasewadi. It has two chief sources, one near Jamgaon about 20km. West of the town of Ahmednagar and other near Jeur about 16km. to its north-east. For a distance of about 55km. roughly, the river forms the boundary between the Ahmednagar district on the one hand and the Beed district on other. On the right, it receive the waters of Mahekri and ultimately joins the Bhima on the Karnataka state border. It has earth filled Sina dam near Karjat in Ahmednagar district.

Now a days the condition of Sina River in Ahmednagar city is very bad and very polluted by residential, commercial as well as industrial. Existing water sources fall short in satisfying the needs of increasing global population. Use of Sewage water for irrigation purpose is one of the remedies to overcome this shortage of water. Extensive literature survey shows that sewage water has agronomic value because of its varied composition. Due to the nutrients present in

it, sewage water s widely used for irrigation purpose. Continuous irrigation with sewage may result in accumulation of heavy metals to severely toxic level in soil. Plants and vegetables which are part of human diet can absorb these accumulated heavy metals from water and soil. This can lead to long term

toxic effects on human health as metals are non-degradable. Uptake of excess heavy metals by higher plants can modulate or initiate a diverse metabolic changes leading to global phototoxic response. Heavy metals can alter the metabolic process which can be toxic to human health.

Being a very rapidly growing city, Ahmednagar is much more dependent on sewage water for irrigation especially for vegetables at Delhi gate and Sarasnagar area of the city. This area is mainly using this sewage water as a source of irrigation since 1972 and growing vegetable crops like cauliflower, cabbage and brinjal. Owing to this fact there is increasing risk of accumulation of heavy metals in soils as well as crops at toxic levels. In present study, trace element analysis of sewage and well water of Ahmednagar city has been carried out.

2. The problem statement:-

Now-a-days situation of Sina River is very bad and very polluted due to the Industrial, Commercial and Residential waste water directly discharge into the Sina River without treatment and also dry refuse disposed in Sina River and due to this bank of Sina River is get narrow. Due to this there is no aquatic life in Sina River. This polluted water is used by surrounding areas like Delhi Gate and Sarasnagar for agricultural purposes. So the cultivation capacity of that soil is getting reduced and it also affect the quality of crop. This ultimately create the health problem.

3. Source of polluted water in Sina River

There are numerous causes of water pollution in Sina River, The main ones are listed below.

- **Industrial process:** When manufacturers and factories are simply allowed to pour toxic chemicals into water bodies before treatment, the water becomes polluted. The oxygen levels in the water also decreases. The toxic chemicals include: lead, sulphiric acid, mercury and used oil. In Ahmednagar SUN FARMA & EXIDE BATTERIES is chemical industry which produces waste like sulphuric acid, lead etc.
- **Inorganic Industrial waste:** Inorganic wastes such as acids, mercury, lead and heavy metals can destroy the normal body processes. The presence of these toxic and corrosive substances in water is dangerous to living things. Factories and other industries dump waste products into water at an alarming rate. In Ahmednagar industrial area company named GKN which manufactured spare parts of bikes is produces inorganic waste like slag, fly ash.
- **Agricultural fertilizers:** By a process known as leaching, agricultural chemicals such as fertilizers and pesticides can wash into rivers and lakes, poisoning them. While agriculture al use of chemicals is restricted

to a limited number of compounds. Agriculture is one of the few activities where chemicals are intentionally released into the environment because they kill things. It is difficult to separate ecological & human health effects of pesticides from those of industrial compounds that are intentionally and accidentally release into environment. However, there over wheeling evidence that agricultural use of pesticides has measure impact on water quality & leads to serious environmental consequences. Some fertilizers are urea, ammonium nitrate, ammonium sulfate, Calcium nitrate.

• **Untreated sewage from households:** Dye, lotion, soap, hair oil, shampoo, powder, deodorant, moisturizer and many other such products also contribute in water pollution. These products go to the sewage without any treatment. Untreated sewage from households can contaminate different water bodies in the process. When sewage pipes break, there is a chance that the wastes will contaminate drinking water. Sometimes, poorly treated sewage is released into water bodies. Domestic cleaning products can be very dangerous pollutants.

4. Analysis of characteristics water :-

4.1 pH Test :-

P is "potenz" of power of (H+), hydrogen ion concentration. pH is very important in water chemistry, with which supply and sanitary engineers are very much concerned.

pH is = -log10 {1/H+}. The pH of water or wastewater is a measure of its free acidity or alkalinity.

Range	Nature
0-7	Acidic
7	Neutral
7-14	Alkaline

Table- pH Range

4.2 D.O. Test :-

Solubility of atmospheric oxygen in water depends on altitude (atmospheric pressure), temperature & salt concentration in water. At 0^0C, 20^0C & 35^0C saturation the Dissolved Oxygen concentration is 14.62, 9.17 & 7.0 mg/liter, respectively in clean water at 1.0 atmospheric pressure.

Higher temperature, higher salt concentration, higher altitude and higher organic matter content reduce the dissolved oxygen in water.

We refer IS3025:(Part 25) 2003 for this test. The purpose of this test is to measure the dissolve oxygen level in the water. When oxygen level more- little pollution and when oxygen level less- more pollution.

4.3 Turbidity Test :-

Turbidity is a characteristic of suspended matter in water, which offers obstruction to the passage if ligh throught it. The greater the obstruction offered the greater is the turbidity of water. Turbidity in water is caused chiefly by inorganic matter such as clay, silt and rock debris and to a lesser extent by organic matter such as sewage solids algae, bacteria, protozoa and other micro-organisms. Turbidity is more in rainy season (because of erosion of soil it get mixed with run off) than in winter and summer. It is more in river water than in water4 from underground sources.

4.4 COD Test :-

The chemical oxygen demand (COD) test is widely used as a means of measuring the pollutional strength of domestic and industrial wastes. It is the measurement of a waste in terms of the total quantity of oxygen required for oxidation to carbon dioxide and water.

Relation between BOD & COD:- During the determination of COD organic matters are oxidized completely regardless of their biological assimilability . Hence COD values are greater than BOD values and may be much greater when significant amounts of biologically resistant organic matter are present. Ratio of BOD and (COD-BOD) is called treatability index.

T.I. = BOD/COD- BOD

Range of Treatability Index	Type Of Treatment Required
T.I. < 0.5	Chemical Treatment
0.5 < T.I. < 1.0	Biological treatment plus nutrient supplement
T.I. > 1.0	Biological Treatment

Table- Treatability Index

COD=(V1-V2)N*8000/Vo

4.5 BOD Test :-

BOD is defined as the amount of dissolved oxygen required by bacteria to oxidize the decomposable organic matter, present in wastewater under aerobic. A known volume of a sample of wastewater is incubated at 200 c for 5 days. DO depletion in the test bottles is a measure of amount of biodegradable organic matter present in the sample. for this test incubation bottles used.

BOD=D1-D2-(B1-B2) F *1000/P

Results of conducted test on Sina River to analyze the characteristics of Sina River water. The tests are as follows:-

TEST	**PERMISSIBLE RANGE**	**RESULT**	**REMARK**
pH	6.5-8.5	8	Suitable
D.O	5 mg/lit	6.9	Unsuitable
TURBIDITY	1-5 mg/lit	28.7	More Turbid
COD	250mg/lit	600mg/lit	Not suitable
BOD	2-8mg/lit	975mg/lit	Not suitable

Table - Obtained result

5. Methods for cleaning the River

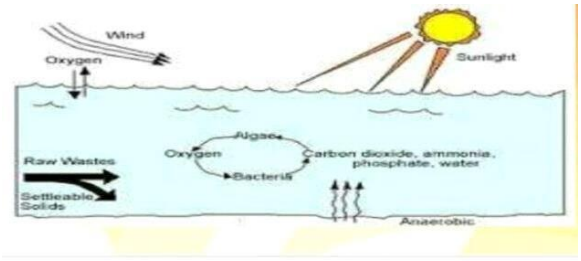
5.1 Activated Sludge :

The activated sludge process was developed in the year 1914 in England, by Arden and locket. It was named so, because the process is involved in the production of an activated mass of microorganism which is capable of stabilizing the waste aerobically, through a lot of modifications have taken place in the process the fundamental principles have remained the same. The term activated sludge, it indicate that the sludge is obtained by settling the sewage in presence of abundant oxygen.

1. The activated sludge is mixed with raw or partially treat sewage .
2. When the AS is mixed properly with the sewage having sufficient quantity of oxygen, the micro-organisms in the AS, go on multiplying vary rapidly.
3. This helps to oxidize the organic solid in the sewage .
4. Suspended and colloidal matter in the sewage, gets coagulant to form a readily settle able precipitate.
5. When the precipitate settle down the effluent is cleared from any type of organic matter so if required the effluent is given the treatment chlorination. The part of the sludge is send for recirculation and remaining sludge goes to the digestion tanks.
6. This digested sludge is totally harmless and can be sent to the drying beds.

5.2 Oxidation Pond :

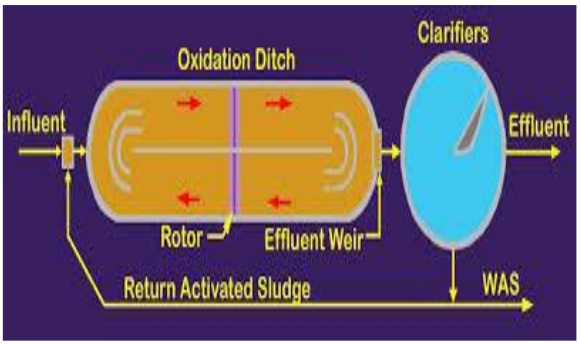
They are also called as stabilizat**ion** ponds. these ponds having shallow basin depth and long detention period .Oxidation pond process is natural, because it uses microorganisms such as bacteria and algae.



Oxidation Pond

5.3 Oxidation Ditch:

It is open deep trench. It issued to allow the industrial waste water to settle down. It is biological method to treat the industrial waste water. In the circular basin known as oxidation ditch, the screen is used to remove the solids. Then the waste water is allows to pass through the AS, so the microorganisms digest B.O.D. The oxygen is added to the mixed sewage by using ROTATING BIOLOGICAL CONTACTOR (R.B.C.).Then the sludge is removed in the clarifier and it is sent to an aerobic digester, where it is thickened, by using an aerator pumps some sludge is sent back to oxidation ditch and rest of the sludge is disposed off.

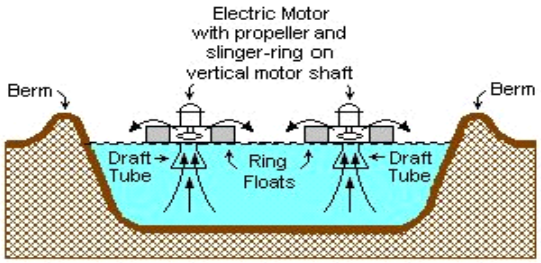


Oxidation Ditch

5.4 Aerated Lagoons:

They are the deep oxidation ponds. In these lagoons the oxygen is introduced by surface aerators. These lagoons need lesser area and lesser detention period than the oxidation ponds. In these lagoons the waste water or sewage is treated either on a flow through basis or by the recycling of the solids. **Process:**

They are the simple earthen basins which get a continuous supply of oxygen by the number of surface aerators. Due to the actions of the surface aerators the contents of the sewage are kept suspended. These contents are initially seeded by the micro organisms. The same of types of micro-organisms are used for the biodegradation of the ASP.



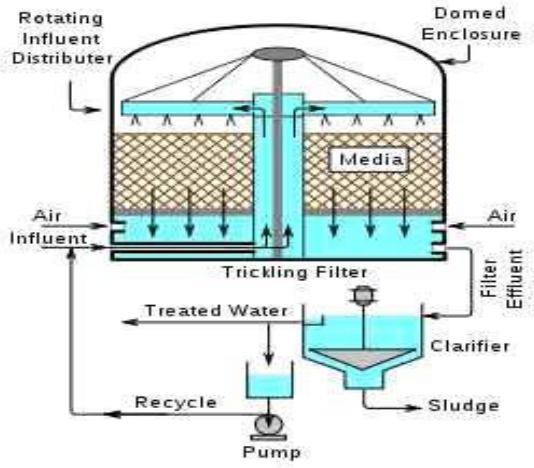
A TYPICAL SURFACE – AERATED BASIN

Note: The ring floats are tethered to posts on the berms.

Aerated Lagoon

5.5 Trickling Filter :

It is also known as sprinkling filters. The sewage is allowed to sprinkle over the bed of hard, rough and coarser material.



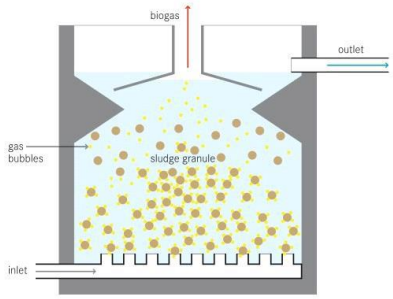
Trickling Filter

5.6 U.S.A.B :

It is introduced by Lettinga and his team in the year 1970. It is mainly used to treat the industrial effluent . The bio-gas is allowed to go out through the distribution system. The liquid flows through the weirs into gutters .The suspended , settle down in the blanket of sludge.The bio-gas is used for the appropriate ending.

Process –

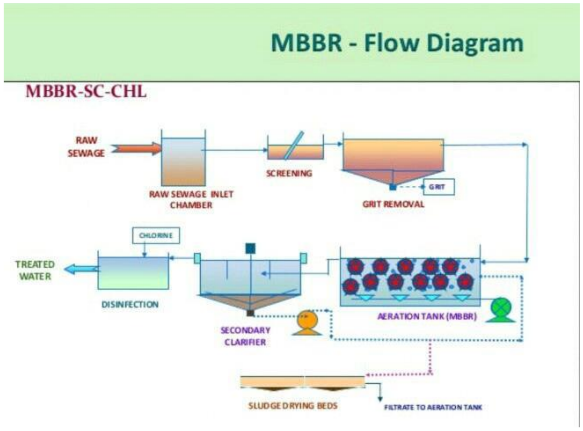
1. This system consists of an up- flow anaerobic sludge blanket reactor : which has three phase settler. It is kept at the top of the reactor and has been designed with specific organic loading and the hydraulic loading throughout.
2. It separates the sludge the liquid and the gas
3. The raw material is pumped through the influent header.
4. It has the online cleaning capacity.



U.A.S.B (Up Flow Anaerobic Sludge Blanket Reactor)

5.7 MBBR

MBBR is new and efficient biofilm reactor, which has many characteristics such as anti- load ability, high treatment efficiency and long sludge age which means less surplus sludge, good removal effect of nitrogen and phosphorus, no sludge bulking and other benefits. Now days, MBR has a large –scale popularization and application.



MBBR (Moving Bed Biofilm Rector)

5.8 IFAS :

Integrated fixed film activated sludge (IFAS) systems add fixed or free floating media to an activated sludge basin to encourage the growth of biomass and enhance the treatment process. IFAS systems are being implemented at an increasing number of wastewater treatment facilities to expand the capacity of the activated sludge system in the same tank volume. Hazen and Sawyer completed a demonstration of an IFAS system successful in achieving nitrification with less than 50 percent of the volume required for a conventional system. IFAS media can be plastic or fabric. The amount of biomass that grows on the media depends on a host of factors, including loading, dissolved oxygen concentration, temperature, mixing energy, suspended phase biomass concentration, and solids retention time. The attached biomass combines with the suspended concentration to achieve much greater total biomass. Since the attached biomass is retained in the activated sludge basin, and not sent to the clarifiers, use of IFAS technology can increase the capacity of the activated sludge system in the same tank volume.

IFAS Process

6. CONCLUSION:-

We conducted some test on Sina River water like Ph, Turbidity, COD, BOD, D.O. & according to result the obtained result values are higher than permissible range hence we conclude that Sina River water is highly polluted in Ahmednagar and can not be utilized for domestic use without treatment.

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