

CHARACTERISTICS OF DOMESTIC WASTEWATER OF KALABURAGI CITY

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Abstract: A study was undertaken to assess the characteristics, like physical and chemical analysis, of the wastewater of Kalaburagi City. The characteristics are analysis of total solids, suspended solids, dissolved solids, dissolved oxygen, biological oxygen demand, chemical oxygen demand, phosphates, and nitrates. The present study shows that domestic wastewater is organic in nature, having average values of BOD of 380 mg/l, COD of 510 mg/l, total solids of 3200 mg/l, dissolved solids of 2000 mg/l, chloride of 220 mg/l, and suspended solids of 1200 mg/l.

Keywords: Domestic Wastewater, Solids, BOD, COD.

1. INTRODUCTION

Physically, domestic wastewater is usually characterised by a grey colour, musty odour and has a solids content of about 0.2%. The solid material is a mixture of food particles, paper, oil, soap, salts, metals, detergents, and grit. The solids can be suspended (about 25%) as well as dissolved (about 75%). Dissolved solids are chemical and biological processes. Chemically, wastewater is composed of organic (70%) and inorganic (30%) compounds as well as various gases. Organic compounds consist primarily of carbohydrates (25 %), proteins (65 %) and fats (10 %), which reflect the diet of the people. Inorganic components may consist of heavy metals, nitrogen, phosphorus, pH, sulphur, chlorides, alkalinity, Sodium, and Phosphate toxic compounds. However, since wastewater contains a higher portion of dissolved solids than suspended, about 80 to 90% of the total inorganic component is dissolved and about 45 to 60% of the total organic component is dissolved. Gases commonly dissolved in wastewater are hydrogen, methane, ammonia, oxygen, carbon dioxide and nitrogen.

Biologically, wastewater contains microorganisms but the ones that are classified as

1. Protista
2. Plants
3. Animals.

The category of Protista includes bacteria, fungi, and algae. Plants include ferns, seed plants and liverworts. Invertebrates and vertebrates are comes under the animal. In terms of wastewater treatment, most are fungi, bacteria and algae.

Domestic wastewater is discharged into some river lakes or streams floating solids present in the discharge of domestic wastewater create foil smells and bad odours. Domestic wastewater includes the kitchen, bathroom, and laundry as well as water pouring down the drainage. Domestic wastewater is 99.9% water it requires treatment if the nuisance is to be avoided. A large amount of organic matter parent in the discharged domestic wastewater will also consume the dissolved oxygen from the river getting oxidized and may seriously decrease the dissolved oxygen in the river. Poorly treated or untreated domestic wastewater has high pollutants creating major environmental problems when discharged into surface water or land. Such problems may include contamination and deoxygenating of streams, rivers, and lakes by the direct discharge of good enough treated wastewater. The inorganic compounds include chlorides, metallic salts, ash, road grit, etc. The main constituents of domestic sewage can be listed as solids, chlorides, alkalinity, biological oxygen demand, chemical oxygen demand, nitrogen, phosphates, sulphates, etc. The organic matter in the wastewater is described in terms of biological oxygen demand (B.O.D) and suspended solids (S.S). Necessary to study the characteristics and behaviour of domestic wastewater to ensure its safe disposal. This study will help us in determining which type of treatment is suitable.

1.2 Objectives Of The Study:

This study was carried out with the following objectives:

- To study the physical and chemical characteristics like pH, TS, TDS, TSS, BOD, COD, Nitrate, and Phosphate of domestic
- To determine the strength of the domestic wastewater
- To determine the nature of the treatment

2. MATERIALS AND METHODOLOGY

The study was conducted under ambient environmental conditions. The domestic waste water sample was collected from the Kalaburagi 40 MLD sewage treatment plant at Nandikur. As illustrated in Fig. 2.1, A sample of wastewater (sewage) is done by adopting the grab sampling technique. The sample is collected in a 10 litre can and immediately brought to the lab by adopting the standard preservation technique.

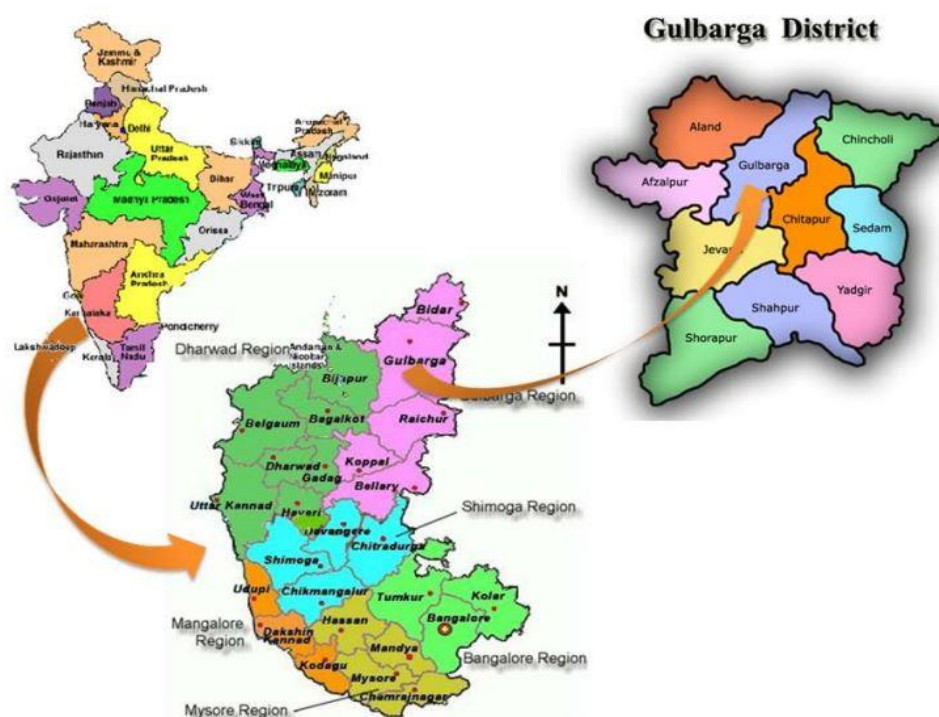


Fig 2.1: Location map of kalaburagi city

2.1 Analysis Of Physico-Chemical Characteristics Of Wastewater:

Domestic wastewater is used in the experiments. The characteristics of the samples such as pH, Biological oxygen demand (BOD₅), Chemical oxygen demand (COD), Total solids(TS), Total dissolved solids(TDS), Total suspended solids(TSS), nitrate, phosphate, and chloride are to be analyzed as shown in the table. 2.1. Experiments are conducted in the main laboratory situated at PDA College of Engineering, Kalaburagi, Karnataka.

Table.2.1 Physico-chemical parameters and the methods adopted

Sl. No	Parameters	Methods	Equipment's
1	Colour	Visual comparison method	-
2	Odour	Detecting by nose	-
3	pH	Electrometric	pH meter
4	BOD	Winklers method	BOD incubator
5	COD	Open reflux method	Reflux flask
6	TS	Gravimetric Analysis	Hot air oven
6	TDS	Gravimetric Analysis	Electronic balance
7	TSS	Gravimetric Analysis	Hot air oven
8	Nitrate (NO ₃)	Phenol disulphonic acid (PDA) method	Spectrophotometer
9	Phosphate	Stannous Chloride Method	Spectrophotometer
11	Chloride	Argentometric method	Glass wares

3. RESULTS AND DISCUSSION

The Physico-chemical characteristics of domestic wastewater are shown in the table below.

Table 3.1: Physico-chemical characteristics of Domestic Wastewater

Sl No.	Parameter	Characteristics of Domestic Wastewater
1	Colour	Grey colour
2	Odour	Musty odour
3	Temperature	33.5 °C
4	BOD	380 mg/l
5	COD	510 mg/l
6	pH	7.3
7	TS	3200 mg/l
8	TSS	1200 mg/l
9	TDS	2000 mg/l
10	Nitrate	16 mg/l
11	Phosphate	3.3 mg/l
12	Chloride	220 mg/l
13	BOD/COD	0.74

From Table 3.1, the average 5-day BOD is observed to be 380 mg/l. whereas the BOD in the typical composition of untreated domestic wastewater is in the range of 110 to 350 mg/l. So the wastewater is highly organic in nature. The BOD value is high so waste is a strong waste. The typical composition of COD in raw sewage is in the range of 250 to 800 mg/l, against a value of 510 mg/l, which is almost within the acceptable limits. The mean value of the BOD to COD ratio is found to be 0.74.

The wastewater solids may be classified into total solids, suspended solids, and total dissolved solids. In general, the concentration of total solids in untreated wastewater as per Indian conditions is from 350 to 1300mg/l. The average value of total solids as shown in table 3.1 of Kalaburagi city is 3200 mg/l, which is the general concentration of domestic sewage.

The nitrate content in untreated sewage is observed to be in the range of 12 to 45 mg/l. Nitrate being an essential component of biological protoplasm, its concentration is important for the proper functioning of biological treatment systems and disposal on land. The mean value of nitrate content is 16 mg/l, which indicates that the sewage is weak in its nitrate content. It shows the decomposition state of the wastewater.

4. CONCLUSIONS

- It can be concluded from the study that the waste water is organic in nature, having average values of BOD of 380 mg/l, COD of 510 mg/l, total solids of 3200 mg/l, dissolved solids of 2000 mg/l, and suspended solids of 1200 mg/l.
- Based on the study, it can be concluded that domestic wastewater has high strength and dark grey colour.
- The pH value shows that the wastewater is slightly acidic in nature.
- The BOD₅/COD ratio should be 60% for biological decomposition, but the ratio is 70%, so it can be easily degraded biologically.

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BIOGRAPHY



Dr. Shashikant Revanappa Mise was Academically well-versed and professionally well-versed. a very brilliant student throughout In my academic career, I placed first in the taluka in the SSLC Exam, and I hold a BE (Civil), ME (Environmental Engg Gold Medalist), and a PhD. I worked as a lecturer at REC Bhalki and M.S. Bidve Engg College Latur. Since 1990, I have been teaching PG Environmental Engineering at PDACE Gulbarga. Under my supervision, 05 candidates received PhD s and 8 candidates registered for Ph.Ds. I guided 125 M.Tech theses and hold a Chartered Engineer certificate. I published 111 papers in reputed international and national journals. I worked as a Dean Academic, Dean (Research and Development), Controller of Examinations PDACE, Chairman & Secretary IEI local centre Kalaburagi, and IEI State Committee Member Bangalore. My name has been included in the World's WHO and America's WHO, and I have been awarded the Best Citizen of India and Best Teacher Award. From 2006-2011, I worked as a Special Officer for VTU Regional Office Kalaburgi.



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