Characterization of Sullage Collected from Residential Building

B. Saritha, Chockalingam M.P, L Maria Subashini

Abstract: The present study is about the analysis of sullage collected from Tiruvanchery region, Chennai, Tamil Nadu, India. Sullage is the waste water from households, sinks, bathrooms, kitchen households but except the waste water from toilets. In this project, 6 samples of waste water were collected in 3 different apartments. The apartments are Ruby Grand, Ruby Regency and Green Paradise. The 2 samples of the waste water are the kitchen waste water and washing clothes waste water. Physical, chemical and biological parameters are tested in environmental laboratory. The chemical parameters were tested using titrimetric method. It is found that all samples were safe against pH, Alkalinity, Flouride, Chloride, Iron, Phosphate, and Turbidity which are within the permissible limits of IS3306 (1974).

Keywords – Sullage-water, physio-chemical analysis, BOD-COD analysis, treatment methods.

I. INTRODUCTION

Sullage is the impure water which contains bacteria and soil contents. Water is one of the most important substances on earth[1]-[5]. Water pollution is an addition of foreign substances either organic/inorganic or biological or radio-active substances into water in excess, which alters the quality of water and which may be pose health hazard.

Water pollution effects the entire biosphere plants and organisms living in these bodies of water. The study of sullage was carried out to determine the physio-chemical and biological parameters of the sullage collected from residential building and to appreciate the opportunity of building a wastewater treatment plant.

Sullage is the waste water from household sinks, showers, and baths, but not waste liquid or excreta from toilets. The application of grey-water reuse in urban water systems provides substantial benefits for both the water supply subsystem by reducing the demand for fresh clean water as well as the wastewater subsystems by reducing the amount of wastewater required to be conveyed and treated[6]-[9].

Sullage doesnot contain high level microorganisms that make it unsuitable for spray irrigation. Sullage can also be used for irrigation purposes. Sullage is generally safer to handle and easier to treat and reuse onsite for toilet flushing,

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landscape or crop irrigation and other non-potable uses. Salts and phosphorus from laundry detergents are pollutants.

II. OBJECTIVES

The main objective of the study is to :

- Find the physical, chemical and biological characteristics of sullage collected from Tiruvanchery region.
- Compare the analysed sample against IS 3025 (Part –I) 1987.
- Suggest reuse and recycle of sullage[10]-[13].

Region, Chennai												
SI. No.	Parameters	Ruby Grand		Ruby Regency		Green Paradise						
		Α	B	A	B	A	B					
1.	pH	7.0	8.5	7.0	8.0	7.5	7.0					
2.	Alkalinity (mg/l)	40	80	16	20	50	45					
3.	Hardness	75	90	40	45	75	70					
4.	Chloride (mg/l)	24	50	25	30	35	30					
5.	Total Dissolved Solids (mg/l)	166.8	264	97.2	114	192	174					
6.	Fluo ride (m g/l)	1.0	0.5	0.5	1.0	1.0	0.5					
7.	<u>lgo</u> n (m g/l)	0.3	0.3	0.3	0.3	0.3	0.3					
8.	Ammonia (mg/l)	0	1.0	0	0.5	0	0.5					
9.	Nitrite (mg/l)	0.2	0.5	0.2	0.2	0.2	0.5					
10.	Nitrite (mg/l)	20	45	45	20	20	45					
11.	Residua <u>Ichlorine</u> (m g/l)	0.2	0.5	0.2	0.5	0.2	0.5					
12.	Phosphate (mg/l)	3.0	0.5	2.7	2.3	2.5	2.1					
13.	Conductivity (mg/l)	1.79	3.12	1	2.0	2.0	1.0					
14.	BOD (mg/l)	245	260	250	265	243	260					
15.	COD (mg/l)	540	620	550	625	535	620					

 Table 1: Sullage Sample Collected From Tiruvanchery

 Region, Chennai

A=Kitchen wastewater B= Clothes wastewater

Table 4.2: Quality Standards Of Treated Waste Water

Standards		pН	BOD	Turki dity	TS S	FC	RC mg/L	Reference
			mg/L	(NTU)	mg/L	cfu/100		
						ml		
CPCB	On land for	5.5-9	100	-	200	-	-	CPCB (2008)
India	irrigation".							(ref: 44)
	Into inland	5.5-9	30	-	100	-	1	
	surface water							
	Into Public	5.5-9	350	-	600	-	-	
	sewers".							
USEPA	Unrestricted	6-9	10	2	-	0	1	USEPA
	use ^d							(2012) (ref:
								46)
	Restricted use	6-9	30	-	30	200	1	



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III. RESULTS AND DISCUSSIONS

In the graph, the pH of all sullage samples are shown.



In the graph, the alkalinity of all sullage samples are shown



. In the graph ,the hardness of all sullage samples are shown. Little amount of the sullage samples were not safe.



In the graph, the chloride of all sullage samples are shown. Little amount of the sullage samples were not safe. This may be due to fertilizers, residential wastes and minerals[14]-[18].



Figure - 4 Chloride

In the graph, the TDS of all sullage samples are shown. Little amount of the sullage samples were not safe. This may be due to livestock waste, septic system, dissolved minerals, iron and manganese.



In the graph, the flouride of all sullage samples are shown.



In the graph ,the Iron level of all sullage samples are shown. Little amount of the sullage samples were not safe. This may be due to leaching of cast iron pipes sin water distribution system[19]-[22].



In the graph ,the Ammonia of all sullage samples are shown. This may be due to improper waste disposal.



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In the graph ,the Nitrite of all sullage samples are shown.



In the graph ,the Nitrate of all sullage samples are shown. Little amount of the sullage samples were not safe. This may be due to livestock facilities, septic systems, manure lagoons, household waste water, fertilizers and natural deposits[23]-[29].



In the graph ,the Residual Chlorine of all sullage samples are shown.



Figure – 11 Residual chlorine

In the graph ,the Phosphateof all sullage samples are shown.



In the graph ,the Conductivity of all sullage samples are shown.



In the graph ,the BOD of all sullage samples are shown.



In the graph ,the COD of all sullage samples are shown.



IV. CONCLUSION

The project has been carried out by collecting the sample (sullage) from the selected areas of Tiruvanchery region (Ruby Grand, Ruby Regency and Green Paradise). Two samples each has been collected from each area which includes kitchen wastewater and clothes wastewater[30]-[36]. The results showed that all the samples were safe against pH, Alkalinity, Flouride, Chlorine, Iron and Phosphate which were found to be within the permissible limits of IS3360 (1974). Thus, there may not be any treatment required for the above parameters. However, the water should be treated against Hardness, Total Dissolved Solids (TDS), Ammonia, Nitrate, Nitrite and conductivity as they are not found within the permissible limits of IS3360 (1974). From the results the waste water can be used for irrigation purposes.

The project was successfully completed by suggesting the possible treatment method for the sullage water.



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