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PHYSIOCHEMICAL ANALYSIS OF SEWAGE WATER OF AMBAH TOWN, MORENA, MADHYA PRADESH

Author's Name Ramakant Sharma[1], V.K. Jain[2] and Ashish Shukla[3]

Affiliation:

1. Assistant Professor, Ambah P.G. Autonomous college, Ambah, Morena, Madhya Pradesh, India
2. Professor, Ambah P.G. Autonomous college, Ambah, Morena, Madhya Pradesh, India
3. Student (M.Sc. Chemistry Semester 1st), Ambah P.G. Autonomous college, Ambah, Morena, Madhya Pradesh, India

Corresponding Author Name & E-Mail: Ramakant Sharma, ramakant1178@gmail.com

ABSTRACT

Water is a very essential element of life, which is the most important concern of Mankind because it has direct impact on human life and directly linked with the human welfare. The water samples are collected from mainly four sites of Ambah town district Morena, Madhya Pradesh; we collected 8 samples, 2 from the each site that reveals that pH varies from 7.2 to 7.8, TDS varies from 560 to 567.75, turbidity varies from -0.23 to -0.20, dissolved oxygen varies from 0.3 to 0.7, hardness varies from 310.30 to 315.31, magnesium varies from 10.2 to 12,fluoride varies from 0.51 to 0.57, phosphate varies from 0.04 to 0.07 and electrical conductivity varies from 912.25 to 915.25. By this study, we can say that with the setup of a treatment plant a large problem of sewage water can be solved and availability of water can be improved. In the absence of the sewage water treatment plant, there are certain methods, which are discussed below, can be used as an alternative method for the temporary basis that reduces the toxicity of the sewage water. By the proper treatment of the sewage water, water scarcity can be reduced at large scale and water related health issues can be reduced, even availability of drinking water can be secured.

Keywords: Sewage, Municipal Wastewater, Industrial Wastewater.

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INTRODUCTION

Water is one of the most essential natural resources for the survival of all living organisms. However, in recent years, rapid population growth, climate change, and global warming have led to a significant reduction in the availability of safe drinking water. Increasing water scarcity has created an urgent need to explore alternative water sources, among which wastewater treatment and reuse play a crucial role in ensuring sustainable water management[2,3].The hydrological cycle is the natural mechanism for recycling water; however, due to increasing anthropogenic activities, this natural balance has been severely disturbed. The water used by a community for domestic, commercial, and agricultural purposes is commonly referred to as wastewater or sewage. If untreated sewage is discharged directly into rivers, lakes, or other water bodies, it results in serious environmental pollution, deterioration of water quality, and adverse impacts on aquatic ecosystems and public health[5,6,7]. Continuous exploitation of freshwater resources without proper wastewater treatment may lead to severe water shortages for future generations[8,9].Effective wastewater management requires the adoption of treatment methods that are not only economical but also efficient and environmentally sustainable. Prior to selecting any treatment technique, it is essential to analyze the physicochemical and biological characteristics of wastewater, as this helps in determining appropriate treatment strategies for contaminant removal[2,5].In the present study, wastewater quality of Ambah town has been analyzed. Ambah is a semi-rural town with no major industrial activities; therefore, industrial effluents do not contribute significantly to wastewater contamination. However, a major source of pollution arises from domestic activities and livestock waste. A large proportion of households in Ambah rear cattle such as buffaloes and cows, and improper management of animal excreta leads to its direct entry into the sewage system. The presence of animal dung in wastewater increases the solid load and enhances the production of methane (CH_4) gas due to the activity of methanogenic bacteria present in animal intestines[4,6].Generally, wastewater in Ambah is dominated by domestic sewage and can be classified into two categories: grey water and black water. Grey water includes wastewater generated from household activities such as washing, bathing, and cleaning, containing contaminants like soaps and detergents. Black water consists of wastewater containing human excreta, mainly from toilets and bathrooms, and poses a greater risk due to the presence of pathogenic microorganisms[6,7].The quality of wastewater is assessed using various physical, chemical, and biological parameters. Physical parameters include pH, total solids (TS), total dissolved solids (TDS), and total suspended solids (TSS). Chemical parameters such as total alkalinity, free carbon dioxide (CO_2), dissolved oxygen (DO), total hardness, calcium, magnesium, chlorinity, and salinity provide insights into the chemical nature of wastewater. Biological parameters such as standard plate count (SPC), total coliform count

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(TCC), fecal coliform count (FCC), and fecal streptococcal count (FSC) indicate microbial contamination[6,7,9]. Improper management and untreated discharge of wastewater may result in serious problems related to water quality degradation, groundwater contamination, and long-term water scarcity[1,10].

DESCRIPTION OF STUDY AREA

Ambah town located 33km away from Morena city which is located between the two river channels kwari river and Chambal river. Ambah town mostly locked between the rivers from all the sides. Due to this feature there is no proper channel to discharge the waste water. We can divide Ambah sewage water routes in four types. Most of the sewage water of Ambah collected to the municipal pond without any treatment. In the south side of ambah, most of water goes directly to the agricultural field and in north it filled in the vacant place and agricultural field directly without any treatment.

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SAMPLE COLLECTION

Ambah samples are collected from the four different locations across the ambah which are the main zone of the sewage water collection. Most of the waste water collected there. Two samples are collected from the pond which is filled with sewage water, two samples are collected from the midela road sewage, two from jagga road sewage water filled in agricultural field and two are from porsa road sewage system so we cover almost whole ambah sewage water. Some of the parameters such as pH and temperature are recorded on the site and other parameters are referred to the labs as required.

RESULT AND DISCUSSION

Parameters for research of sewage water-

For the analysis of sewage water of ambah we generally used.

SAMPLE	pH	TDS	Turbidity	DO	Hardness	Magnesium	Fluoride	Phosphate	Electrical Conductivity
Unit		**mg/L**	**NTU**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**µS/cm**
Sample 1	7.2	560	-0.23	0.5	310.30	10.2	0.51	0.04	912.25
Sample 2	7.4	562.25	-0.22	0.7	312	10.3	0.53	0.05	914
Sample 3	7.6	564.50	-0.21	0.3	314	11	0.55	0.06	915
Sample 4	7.8	567.75	-0.20	0.4	315.31	12	0.57	0.07	915.25
WHO	6.5-8.5	<300	<5	≥5	100-300	10-30	0.5-1	<0.05	<40

1.PH OF WATER –

PH is one of the most important parameter of water analysis by which quality of water can be perfectly

determined. Due to the soaps and different types of minerals which are added in waste water from different sources changes the pH of the waste water. It is one on the important factor because it affects many biological and chemical processes in water bodies. The imbalance in pH can contain toxic material which can harm aquatic life. The pH of the different samples is as follow –

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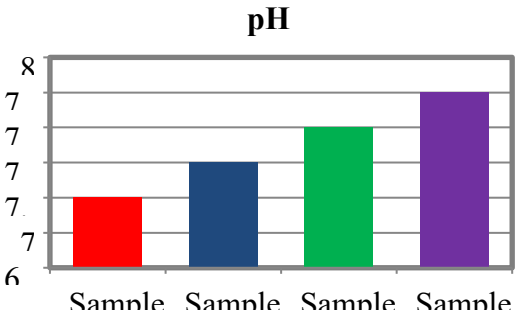
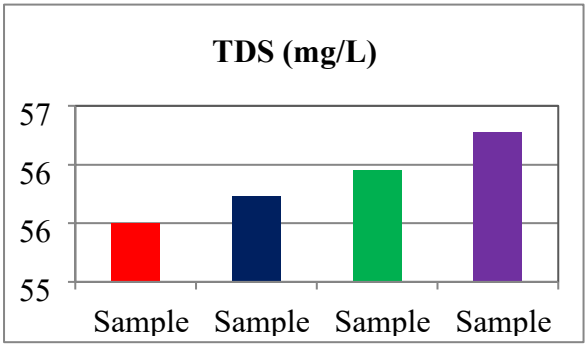


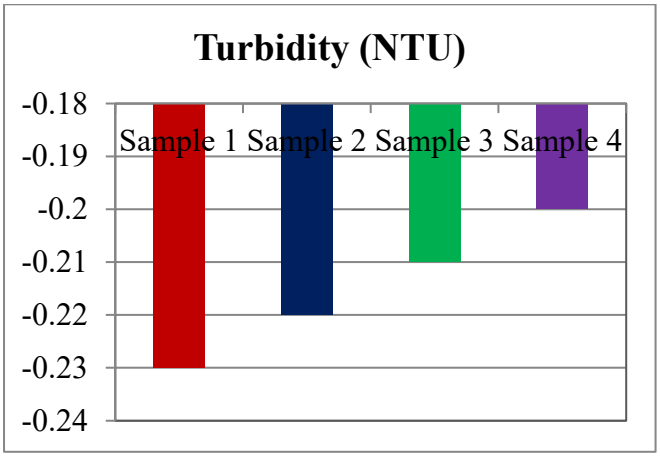
2.TDS (Total Dissolved Solid) –

TDS represent the total dissolved solid in the water. Any mineral, salt, cations or anions, metals are dissolved can be referred as TDS. Inorganic salts and organic matters are dissolved in water also be the TDS.



3.TURBIDITY –

The optical activity due to which light either be absorbed or scattered rather than transmitted in straight line through water is known as turbidity. The cause of turbidity is suspended and colloidal matters such as slit, clay, microorganism and finely divided organic matter.



4.Dissolved Oxygen –

A required amount of oxygen is needed for the support of the aquatic life. Oxygen present in the water in dissolved form at the saturated concentration. The rate of aeration from temperature, temperature, salinity controls the dissolution of oxygen in water.

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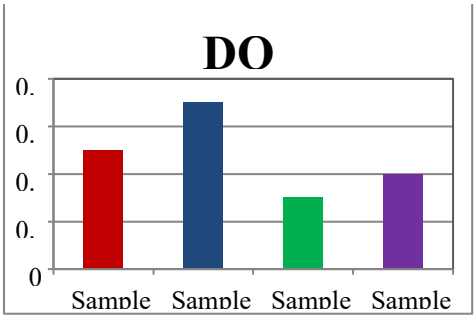
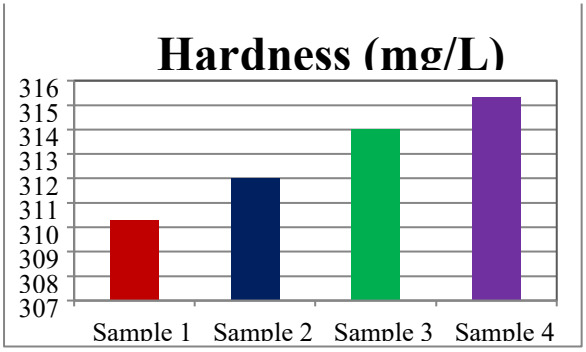


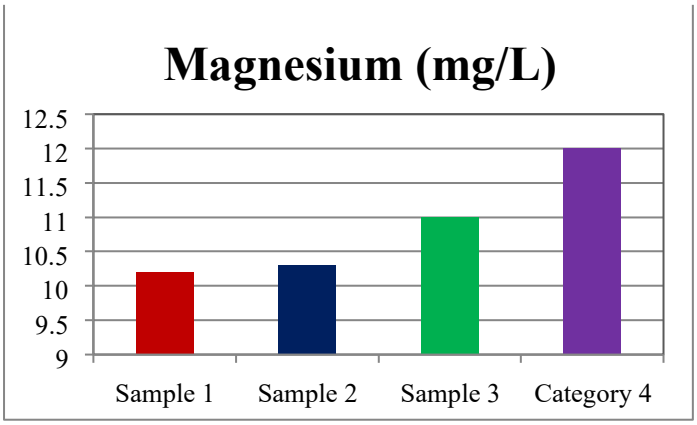
5. Total Hardness –

The natural accumulation of salt from soil or geological formation and pollution is the main cause of hardness of water. The hardness which is associated with carbonates and bicarbonates is known as the temporary hardness where as if associated with sulphate and chloride than known as permanent hardness.



6. Magnesium–

Magnesium in water mainly originates from the weathering of magnesium-rich rocks and minerals. It may also enter water through industrial discharge and agricultural runoff. In moderate amounts, magnesium is essential for human health, but excess levels can increase water hardness.



7. Fluoride –

The main source of fluoride in water is the natural dissolution of fluoride-bearing minerals present in rocks and soil. Fluoride may also enter water bodies through industrial effluents, use of phosphate

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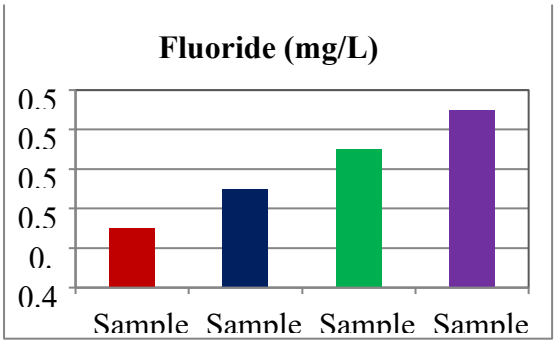
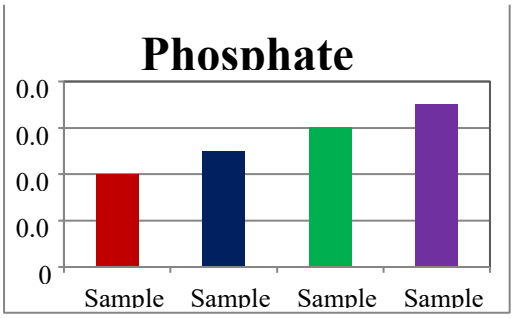
fertilizers, and domestic sewage. In small amounts, fluoride is beneficial for dental health, but excess concentration in drinking water may cause dental and skeletal fluorosis.



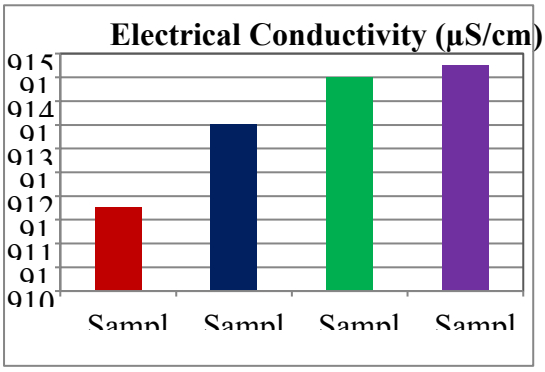
8. Phosphate –

The main source of the phosphate in sewage water is the organic waste(dead bodies of animals) decomposed in water. Less or more amount is sheered from the agricultural field with rain water.



9. Electrical conductivity –

The ability of matter to conduct electricity is known as electrical conductivity. The main cause of the electrical conductivity is the presence of anion or cations in the water. As many ions present in water the value of electrical conductivity increases, water of soaps and detergents increase the electrical conductivity. It is measure in µs/cm.



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CONCLUSION

Ambah town has absence of sewage water plant and due to unavailability of sewage water treatment plant in ambah, most of the waste water either directly released to the agricultural land which affect the productivity of the farms and raise the health related issues where as some water filled in open space untreated due to which it enhance the disease related concerns. Since untreated water is filled for a long time in the open ground, it sheeps to the ground water which may contaminate the ground water and reduce the availability of safe drinking water. Due to lack of proper management of sewage water and most of the sewage system is filled with the more sludge due to which they are mostly blocked. As a result in the season of monsoon roads are over flooded with waste water which is a big challenge to the citizens of the ambah town. If a treatment plant is established in ambah then all the sludge can be converted in the organic manure by a proper channel which opens a good opportunity to the ambah town municipal council to earn a benefit and nature can also secured with such a good initiative. And with a proper analysis and treatment waste water can easily be converted into drinking which reduce the dependence of the people on ground water which enhance the availability of ground water and exploitation of the ground water reduced to some extent. So that the future of the next generation can be secured. The treated water can be used for the different types of activity such as irrigation, gardening in place of fresh waterway forward. It is necessary to setup a sewage water treatment plant to enhance the quality of the water and reduce the exploitation of ground water. But in the absence of treatment plant we can use some basic method to treat the waste water up to a large extent. There is an outline for the temporary method to resolve the sewage water problem.

Process= at first water enters from the inlet and store in the stage first where most of the sludge or solid waste is settle down, which can be extracted and used to produce the organic manure due to the excess presence of organic waste of the animals. There after it transferred to stage second where rest of the sludge is settle down and water transfer to stage three. In this stage almost all the sludge part is separated from the water after that the water is released in the pond having plants having ability to refine the water or we can say that they are the natural water purifiers. There are a large variety of plants which having the property to purifying water and after this process water can be sent to the ground water recharging unit which having their own mechanism to purifying water by several step filtration by means of different layers of material. By using this simple technique we can purify the water up to certain limits which reduce the toxic effects of the water and contamination of the water reduces to a large extent.

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