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RESEARCH ARTICLE

ENVIRONMENTAL ASSESSMENT OF NARMADA RIVER WATER QUALITY AT SANDIA TO HOSHANGABAD & PHOTO DEGRADATION BY NANO-CATALYST ZNO

Nisha Tiwari[1], Arun Kumar Sikarwar[2] and O.N Choubey[3]

1. Research Scholar Govt. Narmada Collage Narmada Puram.
2. Professor of Chemistry Govt. Home Science P.G. Collage Narmada Puram.
3. Professor of Chemistry and Principal of Govt. Narmada Collage Narmada Puram.

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Abstract

In Madhya Pradesh, water is dependent on Narmada River for agriculture, fisheries and other water related works, due to which we can say that the area of current research is Narmada River, in which the physical and chemical observation of the water effect of Narmada River is to be done so that the water of the river can be controlled. The quality of water and the pollution in it are known. Various physico-chemical parameters, including temperature, pH, turbidity, total hardness, alkalinity, DO, BOD, COD, chloride, fluoride, phosphate, nitrate, iron, copper, coliform, were analyzed in the samples, which were taken from five distinct locations. Every parameter is determined using the standardized APHA and BIS and WHO approach. The cause of pollution in Narmada River is sewage which is dumped in Narmada River in large quantities which affects the water quality. The indices from all the places show that the river water is getting polluted rapidly which will result in the river becoming polluted. water will not be potable.The photo catalytic degradation process is an advanced process which is giving a new dimension to water purification (90% to 95%) and protecting the environment as eco-friendly process.

Introduction:-

In today's new era, the increase in human population and urbanization is the reason for sewage which is increasing day by day. Due to increase in pollution and pollution of water, the river water and ecosystem are facing pressure due to which high nutrients are being released. Chemicals and disease-causing pathogens are entering [1].The water of many rivers is used to treat domestic and industrial effluents which is much more than their capacity, thereby polluting the rivers [2-3].The extent of harmful effects of pollution from sewage effluents on water quality depends on the chemical composition and concentration of effluents.

Water pollution refers to point sources that enter river water through various means such as pipes or ditches, which include sewage treatment plants, city drains, some factories, while second pollution refers to diffuse pollution that occurs at one place. This category includes pollutants like pesticides obtained from agricultural land. Due to the rapid growth of urbanization and industrialization, the rivers of India and India are getting polluted which has reached the crisis point. [6-8].Hence, the aim of this study is water quality evaluation at different sites (polluted & non-polluted site) of Narmada River.

Corresponding Author:- Nisha Tiwari
Address:- Research Scholar Govt. Narmada Collage Narmada Puram.

Zinc oxide (ZnO) nano catalyst

The size of the particles of zinc oxide is smaller than 100 nano-meters, they are called nano because these particles have a very large surface area and strong catalytic activity. The energy band gap of ZnO is 3.37ev at room temperature.

Applications for ZnO nanostructures include supercapacitors, dye-sensitized solar cells, lithium-ion batteries, and ultrafast optical functions. They are also employed in a number of environmental, technological, and biomedical fields.

Photocatalytic degradation

Photocatalysis is the name of a type of catalysis that uses light as a source. In photocatalysis, electrons are transferred and pair of electrons are formed by the incoming light on the surface of the photocatalyst which is a semiconductor of metal oxide. In this process, inorganic matter is transformed and organic matter is spoiled and microorganisms are inactivated. Due to its energy power and practicality, UV light is used more. Currently, it is the most used energy source. Which is environment friendly and which is used in advanced oxidation process(AOP).

Study Area

The study would be conducted in the area Sandia to Hoshangabad Narmada river district Hoshangabad.

Sampling and Analytical Design

The water samples were collected from the Narmada River at ten different selected stations S1, S2, S3, S4, S5, during the period of Forbury 2021 to December 2022 (Fig 1). First five samples i.e. S1 to S2 were collected from sandia and SurajKundsite , S3 to S5 was collected from Narmada Puram site. All the samples were collected at morning time between 6am-9am to retain and maintain their properties. The river water samples were collected in pre-washed polyethylene bottles. Prior to collect the sample from sampling sites, the pre-cleaned polyethylene bottles were also washed by water sample.The parameters were measured by the procedures given by APHA [10] in the laboratory.

Photo reactor: --

Photocatalytic degradationexperiments were be done with photo rector photoreactor is 500ml capacity consist of Pyrex glass beaker and a magnetic stirrer on hot plate setup. The radiation source is high pressure UV light.

Result & Discussion:-

Table 1:- The physico-chemical parameter of Narmada River water investigated arepresented.

S.NO.	Parameter	Site-1	Site-II	Site-III	Site-IV	Site-V	Standard value of water by WHO
1	pH	8.04	8.03	7.07	8.10	8.25	7
2	Alkalinity	612	620	645	587	511	20-200mg/L
3	Total hardness	185	164	180	115	186	120-170mg/L
4	TDS	570	561	656	563	670	50-150mg/L
5	DO	5.3	6.5	5.5	6.1	4.7	4.5mg/L
6	BOD	4.2	5.2	4.1	5.2	6.3	3-5mg/L
7	COD	70	78	88	73	89	100-250mg/L
8	Chloride	430	469	569	480	552	250mg/L
9	Fluoride	0.8	0.7	0.6	0.9	1.8	0.5-1 mg/L
10	Phosphate	0.7	0.8	1.3	1.5	2.9	3 mg/L
11	Nitrate	80	88	95	96	95	10 mg/L
13	Coliform	3200-6230	4500-5260	3600-5405	5230-8050	4500-7260	10,000/100ml

According below table-1 if you look at the sample site of Narmada River water Sandia Ghat and Narmada Ghat, then the water here is getting polluted. The pH value range was noted during the study between 7.07 and 8.25, the site 4 and the PH value of the site 5 was noted more than the standard value. Alkalinity was noted from 212 to 301 mg, which is seen much more than the standard value.

The more value of the entire hardness and site number 5 I see more, the value of TDS also has a good result from the Value of the DO's value noted in all sites, which helps the permission value. Value also we have got some more than the permission value and along with the value of the COD is less than the values value but when chloride fluoride and phosphate and nitrate values are destroyed in water.

If this value is more in some sites from the Value Review Value, along with the value of the Coliform, which is almost identical to the permission value, we can say that based on value of water parameters River water is being polluted day by day, if you see the value of TDS pH Alkalinity and chloride, then it is more than the value of the river being polluted by the values. And who are leaving a full impact on Human Body and Living organisms in the form of drinking water.

Table 2:- Effect of Photocatalytic degradation some parameter using ZnOnaocatalyst.

S.No.	Parameter	value without photo degradation	Variationof time with photodegradation	Variationof temperature with photodegradation	Variationof catalystdose with photodegradation
1	Chloride	569 mg/L	518 mg/L	475 mg/L	186 mg/L
2	Fluoride	1.8 mg/L	1.6 mg/L	1.2 mg/L	1.0 mg/L
3	Nitrate	96 mg/L	89 mg/L	66 mg/L	9 mg/L

When with the help of photo catalyst and by taking the variation of time, variation of temperature and variation of catalyst dosage, these variations were applied on the samples with high values of selected parameters like chloride, Fluorideand nitrate, then the following results were obtained below table 2.-

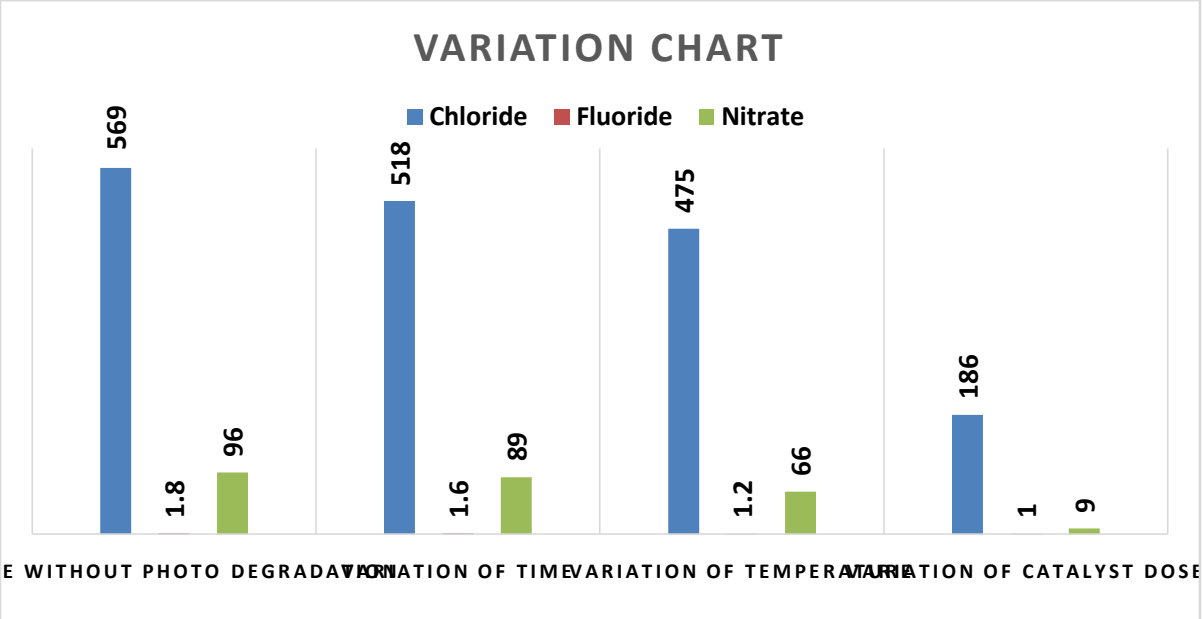

Fig.1:- Effect of Photocatalytic degradation some parameter using ZnOnaocatalyst.

Conclusion:-

It was Experimental that water quality of Narmada River has been affected harmfully by human actions by overloading attended by inadequate sanitation and by unfettered enormous discharge of waste water into water system. The problem of water pollution in River can be minimized by adopting following techniques. Sewage and sludge released by municipal bodies must be chemically and biologically treated before final disposal into River.

The photo catalytic degradation process is an advanced process which is giving a new dimension to water purification (90% to 95%) and protecting the environment as eco-friendly process. All the toxic metallic element

should be chemically treated before waste free into waterbodies.The wastewater characteristics need to be properly monitored for better environmental protection.

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