

# A Short Study on the Physico-Chemical Status of River Ganga Near Kanpur During Winter and Summer

## Abstract

The study involves the Physico Chemical analysis of river Ganga at Kanpur. From the river, water sample were collected from 6 different places during January and May of the year 2013. Due to discharge of industrial influent sewage domestic house hold etc into the river the river water quality deteriorates. The deteriorating water quality of streams is due to anthropogenic activities and reducing fresh water availability Tanning industry is major source of pollution in Ganga near Kanpur city. It is deteriorating the quality of water and aquatic fauna.

**Keywords :** Water quality, River Ganga, BOD, COD.

## Introduction

River Ganga rises from Himalayas, flowing river covering approximately 2525 Km distances. In U.P. Ganga and its tributaries is the largest and very important river basin of the country. The river is stretched over an area of 25 Km in Kanpur. The city Kanpur lies between 80°21" East longitude and 26°28" North latitude in Uttar Pradesh, India. The population of Kanpur is at present near 38 lakh according 2010 census and it may be projected 56 lakh in 2025, releasing domestic sewage into the river. The major source of pollution in the river Ganga at Kanpur is untreated domestic discharges. Industrial effluents etc. According to WHO estimate about 80% of water pollution in developing country, like India is caused by domestic water. The deteriorated quality of water creates various problems for mankind. The growth in population, about 90% of which occur in urban areas, increases the demand for water for domestic and industrial uses. The present study were undertaken to investigate the impact of domestic sewage on quality of river at Kanpur city during the winter and summer seasons.

## Water Sample Collection

The sampling points were chosen to cover the entire span of 25 Km of the river Ganga including the city limits. After preliminary survey of the area 6 sampling stations along the river were chosen for the study to obtain a good distribution of the area to evaluate the overall quality. Among 6 sites 4 sites were found within the city limits. One site before entering the river in the city one was down stream of the city. Locations of the sampling point with respective distance are given in table-1. About 5 samples were collected from each station as per specification (De 1987) and then analysed.

## Material and Method

Water sample analysed within few hours of collection. The pH and temperature were measured at the collection site. Determination of Chloride, Sulphate, BOD, COD, and Phosphate were carried out by standard method (APHA 1996, Trivedi and Goel 1986).

## Result and Discussion

The average values of physico- chemical analysis of water sample collected from 6 sites in the month of January 2013 were tabulated in Table -2. The temperature of the water sample varies among 6.2 to 8.3. The pH value of the water sample varies among 7.4 to 9.5 mostly alkaline. It has direct effect on human health the recommended value for drinking purposes is 8.0 to 8.5 (ICMR 1975).

Total hardness due to carbonate and bicarbonate ranged from 110 to 141. These observed values were slightly low the prescribed limit of WHO and ISI (that is 150 and 200 mg/L). Although alkalinity has little public health significance, highly alkaline waters are unpalatable and are not used for domestic water supply. DO content of the sample vary from 5.4 to 8.3 mg/ L which is in the permissible limit. The amount of DO determines whether the process under going in water are aerobic or anaerobic (Bhagavati, 2001).

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The Bio chemical Oxygen Demand (BOD) values varied from 4 to 13 mg/L. The BOD values clearly indicate pollution, which may be attributed to the maximum biological activity. Chemical Oxygen Demand (COD) varied from 24 to 66 mg/L. The Chloride concentration varies from 13 to 25 mg/L. The tolerance limit being 200 mg/L as per Indian and WHO standard. Similar observations have been made in river Pamba at Kozhencherry (Mathew Koshy and Vasudavan Nayar 2000). The Phosphate value ranged from 0.07 to 0.15 mg/L. High Phosphate value of 0.4 to 7.0 mg/L were reported in river Ganga by Chattopadhyaya (1984). Sulphate is an important component in protein metabolism and plays an important role in growth of plants. The concentration of sulphate ranged from 22 to 31 mg/L. Excess sulphate ion has a laxative effect on human health (Kataria et al. 1995 and Doctor et al. 1998). High value may cause gastrointestinal troubles in human beings. The high value of COD, BOD, PO<sub>4</sub>, SO<sub>4</sub> are indications of polluted water and thus, river water is not fit for drinking purposes and industrial use in the month of January 2013.

Similarly the average values of physico-chemical analysis of water samples collected from 6 sites on the month of May 2013 were tabulated in Table -3

DO content of the samples varies from 4.1 to 6.1 mg/L. It may be due to the high rate of O<sub>2</sub> consumption by oxidisable matter coming along with sewage. Ray and David (1996) noticed that oxygen and high BOD went in hand at sites in the river Ganga where sewage pollution was taking place. The lower DO value observed in majority of stations indicates high pollution load in the river. The Bio Chemical Oxygen Demand values varied from 2.5 to 15 mg/L which may be attributed to the maximum biological activity. Chemical Oxygen Demand varied from 15 to 54.5 mg/L. The Chloride concentration varies from 12 to 25 mg/L. Tolerance limit being 200 mg/L as per Indian and WHO standards. Similar observations have been made in river Pamba at Kozhencherry (Mathew Koshy and Vasudavan Nayar 2000). The phosphate value ranged from 0.04 to 0.13 mg/L. High phosphate value of 0.4 to 7.0 mg/L was reported in river Ganga by Chattopadhyaya (1984). Sulphate is an important component in protein metabolism in growth of plants. The concentration of sulphate ranged from 25 to 32 mg/L. Excess sulphate ion has a laxative effect on human health (Kataria et al. 1995 and Doctor et al. 1998). High value may cause gastrointestinal troubles in human beings. The high value of COD, BOD, PO<sub>4</sub>, SO<sub>4</sub> are indications of polluted water and thus, river water is not fit for drinking purposes and industrial use in the month of May 2013.

After the analysis of water from January and May 2013 it was found that the pollutions observed

into the river body was more polluted at Kanpur due to large quantity of sewage discharge, industrial discharge. Therefore the discharge from industrial and domestic should be treated fully and diluted before draining into river Ganga.

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**Table-1**

S. No	Sampling Points	Distance from A <sub>1</sub>	Places
1	Bithoor (A <sub>1</sub> )	0	At Bithoor
2	Bhairav Ghat (A <sub>2</sub> )	12	At Purana Kanpur
3	Permat Ghat (A <sub>3</sub> )	14	At Peremat
4	Sarsaiya Ghat (A <sub>4</sub> )	18	At Civil Lines
5	Gola Ghat (A <sub>5</sub> )	21	At Cantt
6	Sidhnat Ghat (A <sub>6</sub> )	25	At Jajmau

**Table-2**  
**Physico Chemical Characteristics of River Ganga during winter seasons (January 2013)**

Parameters	A <sub>1</sub>	A <sub>2</sub>	A <sub>3</sub>	A <sub>4</sub>	A <sub>5</sub>	A <sub>6</sub>
Temperature	6.2	6.3	6.4	8.2	7.9	8.3
pH	7.4	8.4	8.7	8.4	8.9	9.5
DO	8.3	7.4	7.2	6.4	7.3	5.4
BOD	4.0	4.8	6.5	6.3	7.6	13.0
COD	24.0	25.0	37.0	30.0	36.0	66.0
Cl <sup>-</sup>	13.0	15.0	18.0	15.0	21.0	25.0
PO <sub>4</sub>	0.07	0.12	0.14	0.09	0.14	0.15
SO <sub>4</sub>	31.0	36.0	22.0	25.0	26.0	27.0
Total Hardness	110.0	114.0	110.0	130.0	141.0	140.0

**Table-3**  
**Physico Chemical Characteristics of River Ganga during Summer seasons (May 2013)**

Parameters	A <sub>1</sub>	A <sub>2</sub>	A <sub>3</sub>	A <sub>4</sub>	A <sub>5</sub>	A <sub>6</sub>
Temperature	35.8	36.0	36.2	36.1	36.4	36.5
pH	7.1	7.6	8.6	8.4	9.4	9.5
DO	6.1	4.8	5.8	6.0	5.2	4.1
BOD	2.5	3.1	4.3	5.7	6.9	15.0
COD	15.0	19.0	27.0	29.0	35.0	54.5
Cl <sup>-</sup>	15.0	12.0	16.0	14.0	25.0	19.0
PO <sub>4</sub>	0.04	0.13	0.11	0.13	0.09	0.11
SO <sub>4</sub>	25.0	27.0	29.0	32.0	30.0	32.0
Total Hardness	150	158	166	159	180	188