



PHYSICO-CHEMICAL ANALYSIS OF RIVER GOMATI AT KERAKAT, JAUNPUR (U.P.)

MAMATA SINGH and RAJ NARAYAN SINGH

Department of Chemistry, S. G. R. P. G. College, Dobhi, JAUNPUR (U.P.) INDIA

ABSTRACT

The metal contaminations and non-metallic pollutants in water control its odour, colour and taste on one side and application as solvent or reaction medium, washing & refrigeration on another side. Such contaminants leave a long-term adverse effects on human health. Also, the biotic contaminants cause innumerable water diseases and health problems. In Gomati river at Kerakat, Jaunpur, during 2004, a periodic and positional estimation of Ca^{2+} , Mg^{2+} , Fe^{3+} , CO_3^{2-} and Cl^- has been done. The variation of these parameters, limiting the applicability of water has been discussed logically.

Key words: Gomati river, Kerakat, Parameters, Physico-chemical.

INTRODUCTION

Although, there is larger improvement in drinking water supply as well as sewage and waste disposal, the present state is still far from being satisfactory. This is due to increasing contamination of surface and ground water, a resultant of increasing agricultural practices, increasing population and energy consumption; these are continuously widening¹.

The scientists are actively interested in study of water pollution problems in big rivers and urban regions of the country, ignoring the fact that small rivers like Gomati covers a significant area and make a huge contribution to the pollution level of Ganga at Aurihar (Ghazipur). More ever, the local problems of health & hygiene, metal corrosion and aquatic hardness may be solved by studying the pollution at the localized site².

Above fact stimulated the authors to take up this project, with reference to water pollution and its removal. The Kerakat is located in eastern part of Jaunpur district. It is

* Author for correspondence; E-mail: rajnarayansingh75@yahoo.in

surrounded by Ghazipur in the east, Azamgarh in the north, Varanasi in the south and city part of Jaunpur district in the west. The geographical limits are latitude $25^{\circ} 31' 30''$ N to $25^{\circ} 46' 30''$ N, longitude $82^{\circ} 42' E$ to $83^{\circ} 05' 10'' E$. Total area of Kerakat region is 587.67 sq. km. The average altitude of the area is about 79 meters above the mean sea level.

EXPERIMENTAL

Materials and methods

The analysis of water of river Gomati was done for the estimation of hardness of water i.e. Ca^{2+} , and Mg^{2+} ; presence of iron Fe^{3+} , carbonate and chloride. For the physical and chemical examination, the samples were collected in chemically clean bottles with standard points stopper. All the parameters were analyzed with the help of standard method³.

The hardness of water is not a pollution parameter but it indicates water quality, mainly in terms of, Ca^{2+} and Mg^{2+} expressed as $CaCO_3$. The analysis is done by complexometric titration⁴.

Iron was analyzed by phenanthroline method⁵. Chloride is rapidly determined by simple titration with $AgNO_3$ solution using K_2CrO_4 as an indicator⁶.

RESULTS AND DISCUSSION

The concentration of Ca^{2+} , Mg^{2+} , Fe^{3+} , CO_3^{2-} and Cl^- in Gomati river in Kerakat region increases from entry towards the exit point (Tables 1 and 2).

Table 1(a): Physico- chemical analysis of water at different sites in Kerakat, Jaunpur (U.P.) Site – A, Duration Jan. 2004 – June 2004

Month & parameters	Jan.	Feb.	March	April	May	June
Ca^{2+}	98.2	98.4	99.2	99.6	99.8	186.7
Mg^{2+}	21.5	21.7	21.7	21.9	22.2	22.4
Fe^{3+}	76.4	76.6	76.7	76.8	77.1	77.3
CO_3^{2-}	147.3	147.5	148.1	148.8	148.4	148.9
Cl^-	132.2	132.6	133.7	133.9	133.2	133.8

Table 1(b): Physico- chemical analysis of water at different sites in Kerakat, Jaunpur (U.P.) Site – A, Duration June 2004 – Dec. 2004

Month & parameters	July	Aug.	Sept.	Oct.	Nov.	Dec.
Ca ²⁺	188.2	188.9	189.5	189.5	112.2	110.4
Mg ²⁺	33.8	35.7	35.8	36.2	21.9	21.8
Fe ³⁺	78.9	79.6	79.8	80.1	76.7	76.6
CO ₃ ²⁻	151.2	153.3	153.8	154.5	151.9	151.3
Cl ⁻	137.4	139.5	139.9	140.7	138.6	138.1

Table 2(a): Physico- chemical analysis of water at different sites in Kerakat, Jaunpur (U.P.) Site – B, Duration Jan. 2004 – June 2004

Month & Parameters	Jan.	Feb.	March	April	May	June
Ca ²⁺	160.6	160.7	161.1	161.5	161.9	162.1
Mg ²⁺	37.6	37.8	37.8	38.0	38.4	38.5
Fe ³⁺	123.3	124.5	123.6	113.7	124.0	124.2
CO ₃ ²⁻	177.3	177.5	178.1	178.8	178.4	178.9
Cl ⁻	159.2	159.6	160.7	160.9	161.2	160.8

Table 2(b): Physico- chemical analysis of water at different sites in Kerakat, Jaunpur (U.P.) Site – B, Duration June 2004 – Dec. 2004

Month & Parameters	July	Aug.	Sept.	Oct.	Nov.	Dec.
Ca ²⁺	351.3	312.8	313.5	314.5	236.8	235
Mg ²⁺	49.9	51.8	51.9	52.3	38.0	37.9
Fe ³⁺	125.8	126.5	126.7	127.0	123.6	123.5
CO ₃ ²⁻	181.2	183.3	183.8	184.5	181.9	181.3
Cl ⁻	164.4	166.5	166.9	167.7	165.6	166.1

As it is known that the hardness of water is not a pollution parameter, but it indicates water quality. From Tables 1 and 2 at different sites, it was seen that hardness of water increases gradually, might be due to the pollution of river. From the table, it was also observed that iron level increases but it is almost similar in all months. Chloride in water is relatively harmless but high chloride contents in water bodies harm metallic pipes and structures as well as agricultural crops⁷. The levels of chloride was also observed in increasing order gradually but in all months, the trend is almost similar.

CONCLUSION

No appreciable levels and variations in biotic contaminant, positionally as well as periodically have been observed at Kerakat. The data reveal a fact that the Gomati river in this belt has a high self purification power for pollutants, which may be attributed to the nature of wild aquatics, texture and structure of the basement soil of the river. The existence of a turning point in a nearby site may partially be elevating the self purification character of river.

ACKNOWLEDGEMENT

Authors are thankful to the Principal, S. G. R. P. G. College, Dobhi, Jaunpur (U.P.) for providing facilities and encouragement.

REFERENCES

1. G. T. Ankley, D. M. Ankley, Di Toro, D. J. Hansen and W. J. Berry, Technical Basis and Proposal for Deriving Sediment Quality Criteria for Metals, *Environ. Toxicol. Chem.*, **15**, 2056-2066 (1996).
2. B. K. Singh, O. P. Singh and Shweta Singh, Ph. D. Thesis (Botany), V. B. S. Pur. Univ. (2007).
3. R. P. Singh and S. K. Singh, Ph. D. Thesis (Chem.), Dr R. M. L. Awadh University, Faizabad (U.P.) (2009).
4. A. P. H. A., Standard Methods for Examination of Water and Waste Water, American Public Health Association, New York, U. S. A. (1989).
5. A. K. De, Environmental Chemistry, 4th Ed., (2000) pp. 164-168

6. Indian Standard Drinking Water Specification 15 10500, Standard for Safe Drinking Water cited in : Contributions of Industrial Toxicology Research Centre, Lucknow to Rajiv Gandhi National Drinking Water Mission, Ministry, of Rural Area and Emploment, Govt. of India, Consolidated Report, 1986-98 ITRC Lucknow, (1991) p. 50.
7. Ragini Bhagat Gupta, P. Joshi, S. Inaotombi and P. K. Gupta, Heavy Metal Pollution Status of Lake Nainital, Uttarakhand, Indian J. Sci. Res., **1(1)**, 1021 (2010).

Revised : 29.11.2010

Accepted : 01.12.2010