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Industrial effluents causing Godavari River water pollution at Nanded, Maharashtra, India

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Abstract

The water after the effluent receiving points was acidic and the levels of the other parameters were high, especially downstream. The results suggested that the water in the river was polluted and not good for human consumption. It is therefore recommended that the careless disposal of the wastes should be discouraged and although the values in some cases were lower than the allowable limits, the continued discharge of the effluents in the river may result in severe accumulation of the contaminants and, unless the authorities implement the laws governing the disposal of wastes, this may affect the lives of the people. The alkalinity of water is a measure of its capacity to neutralize acids. The presence of phytoplankton, there is continuous photosynthetic activity which affects total alkalinity slight alkalinity conditions are favourable for the growth of primary producers. The salty taste produced by chlorides depends on the chemical composition of the water. A high chloride content also has a deleterious effect on metallic pipes and structures as well as on agricultural plants. High concentrations of chlorides may affect some persons who already suffer from diseases of heart or kidneys.

Keywords: Godavari River, pollution, Water Quality, pollutants, alkalinity, chlorides.

Introduction

River Godavari is plays important vital role for Nanded city. Godavari is termed as life line for the peoples living on the bank of river. Godavari river is termed as southern Ganga which is a main source of drinking water for the people living on the bank of river. Chloride ion is the common anion found in water and sewage. The amounts of chloride in a water sample can give an indication of the amount of sewage effluent in river water. There is higher concentration of chloride ion in the hill streams of North Bengal. The higher concentration of chloride ion may be due to sewages, pesticide, leaching etc. Sewage water contains higher chloride ion concentration because sodium chloride is a common article of diet and passes

unchanged through the digestive system. High chloride content may harm metallic pipes and structures as well as the aquatic plants Alkalinity of water is its acid-neutralizing capacity. This is really an expression of buffering capacity. The alkalinity of a water is a measure of its capacity to neutralize acids. The alkalinity of natural waters is due to the salts of carbonates, bicarbonates, borates, silicates & phosphates along with the hydroxyl ion in the free state. A high chloride content also has a deleterious effect on metallic pipes and structures as well as on agricultural plants.

Regarding to irrigation waters, chloride is the most troublesome anion chloride is more toxic than sulphates to most plants. Waters containing excessive amount of chloride, through are not involved directly in corrosion, it accelerates the rate of corrosion of steel, stainless steel alloys and aluminum. Hence the chloride concentration should be carefully controlled in system where their materials are used.

Potable water may contain small amounts of chlorides without any harmful effect. Concentration of chloride ions in excess of 250 mg/lit as sodium chloride, imparts a salty taste to water. But when potassium and magnesium ions are associated with chloride ions. The taste is acceptable even upto 1000 mg/lit of chlorides. Concentration of chlorides is to be an indication of industrial pollution.

Materials and Methods

Water samples were collected separately from each of three sampling stations of the river. The water samples were collected from three sampling stations of Godavari river monthly on fixed date and fixed time. Station A is located near water filtration tank 'Dankin', Station B is near old bridge and Station C is at Wadgaon. The alkalinity is measured by simple titration method. The chloride content, in water sample was estimated in the laboratory with the help of

argentometric method of Mohr. The samples were collected and examined during the year 2017-18 and 2018-19.

Results

Analysis of parameters also indicate that contamination of water of river enhance their pollution in downstream. In the present investigation the total alkalinity values during the year 2017 and 2018 at sampling station-A the alkalinity ranging from 99 to 199 mg/lit, at Station-B alkalinity ranges from 250 to 330 mg/lit and at Station-C alkalinity ranges from 262 to 335 mg/lit. The values during the year 2018 – 2019. The alkalinity values at station-A 102 to 210 mg/lit at station-B 257 to 327 mg/lit and at station-C 268 to 339 mg/lit. The values of total alkalinity are maximum during summer in the month of May and minimum during monsoon in the month of July due to increase in water table. The monthly mean values are given in the table 1 & 2.

The chlorides estimated during the year 2017-2018 are at station-A 150.1 to 162.4 mg/lit, at station-B 247.2 to 264.8 mg/lit and at station-C 249.6 to 266.4 mg/lit. In the year 2018 – 2019 the values of chlorides at station-A are 148.6 to 262.8 mg/lit at station-B 254.8.0 to 265.2 mg/lit and at station-C are 256.2 to 267.4 mg/lit respectively. The values of chlorides are higher in summer and lower in winter. The values are given in the Table 3 & 4

Table No. 1. Monthly Mean Values of Alkalinity (mg/1) from Godavari River (at various sampling stations) Water Samples during the year 2017-18

Month	Station-A	Station-B	Station-C
February	185	305	307
March	190	316	325
April	196	322	331
May	210	327	339
June	180	295	301
July	102	257	268
August	105	260	270
September	110	268	278
October	128	275	275
November	165	280	287
December	175	286	201
January	182	300	319

Table No. 2.Monthly Mean Values of Alkalinity (mg/l) from Godavari River (at various sampling stations) Water Samples during the year 2017-18

Month	Station-A	Station-B	Station-C
February	180	296	300
March	186	305	316
April	192	310	322
May	199	330	335
June	178	290	296
July	99	250	262
August	102	254	266
September	106	262	274
October	122	268	272
November	164	274	282
December	172	280	294
January	180	298	310

Table No. 3.Monthly Mean Values of Chlorides (mg/l) from Godavari River (at various sampling stations) Water Samples during the year 2018-19

Month	Station-A	Station-B	Station-C
February	156.4	258.6	60.2
March	158.2	259.8	261.5
April	160.6	261.2	263.8
May	162.4	264.8	266.4
June	160.2	262.8	263.9
July	154.0	258.4	259.8
August	153.4	255.6	256.2
September	152.8	253.9	255.4
October	151.2	252.5	253.8
November	150.1	251.6	252.4
December	150.2	250.8	251.6
January	151.6	247.2	249.6

Table No. 4.Monthly Mean Values of Chlorides (mg/l) from Godavari River (at various sampling stations) Water Samples during the year 2018-19

Month	Station-A	Station-B	Station-C
February	156.8	259.7	261.8
March	158.9	261.9	262.8
April	160.8	262.6	264.9
May	162.8	265.6	267.4
June	161.0	263.8	264.9
July	155.0	259.9	263.2
August	154.6	257.8	267.0
September	153.2	254.27	256.2
October	151.6	253.8	258.9
November	150.8	254.9	259.9
December	150.9	256.0	257.8
January	148.6	289.0	259.7

Discussion

Water is essential to all forms of life and makes up 50-97% of the weight of all plants and animals and about 70% of human body (Buchholz, 1998). Mahadevan and Krishnaswamy (1983) recorded the total alkalinity values varied from 100 to 214.7 mg/lit in river Vaigal. Somashekher (1984) recorded the high alkalinity values 291 mg/lit, in Cavary River might be due to bicarbonate alkalinity. Shah (1988) recorded total alkalinity ranging from 76.9 to 273 mg/lit in river Jhelum. The variation in alkalinity may be due to seasonal effects. Lohar & Patel (1998) reported the total alkalinity values in the range between 80 to 120 mg/lit in river Tapi while 84 to 104 mg/lit in river Aner. Singh et al (1998) recorded that alkalinity from Rapti river at Gorakhpur range from 44.5 to 207 mg/lit. Mohanta and Patra (2000) recorded total alkalinity ranging from 37.5 to 87.25 mg/lit in the river Sanamachhanandana at Karphogarh.

The Chloride content from river Ganga at Patna was noted in the range of 11.0 to 41.2 mg/lit (Singh, 1997). Salaskar et al (1997) recorded the chloride value range between 83 to 95 mg/lit. The maximum values are recorded during the summer season due to low water table and high effluents concentration similar to the present investigation. Bahura (1998) reported the chloride value ranged between 2.48 to 7.50 mg/lit from temple tank. Irshad Ahmad et al (2000) from Pakistan quality of river water, due to fertilizer industry effluents, the value of chlorides recorded are 42 to 65 mg/lit. Singh et al (1998) recorded chlorides range from 31.5 to 65.7 mg/lit from Rapti river at Gorakhpur. Pondhe et al (1998) recorded chlorides range from 127 to 664 mg/lit from ground water of Puntaba area, Ahmednagar District, Maharashtra. Masarrat Sultana et al (1999) recorded chloride range from 24.14 to 35.50 mg/lit from Godavari river water. Kaur et al (2000) recorded chlorides range from 50.1 to 100 mg/lit from Satlaj river. Chloride (Cl⁻): This anion was determined by titration of the sample with silver nitrate. To 100 ml. sample was added potassium chromate (5%, 1 ml.) and titrated with 0.1 M. silver nitrate solution to the first appearance of a buff color (AOAC, 2002).

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