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City Physico-Chemical Characteristics of Ground Water at Mau, Uttar Pradesh

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ABSTRACT

The ground water is the chief source of fresh water in this small city of Eastern Utter Pradesh. The ground water quality of Mau city experienced degradation due to the immense pressure from the city's textile industry. The samples were collected from fifteen sites covering the entire city of Mau from the hand pumps and bore wells in the months of March-April 2011. Physico-chemical parameters viz., colour, odour, turbidity, transparency, total dissolved solid (TDS), hardness, calcium, pH , chloride, BOD and COD were analyzed.

In most of the samples, water is colourless and does not impart turbidity. Only few samples had odour. TDS was also very high in almost all the samples. The water is moderately hard .The concentration of calcium was within acceptable limits. The pH is above neutral in all the samples and hence shows alkalinity. Chloride concentration was very high in the collected samples. The values of COD and BOD were reported to be also high in the samples collected from different sampling stations.

KEYWORDS: Physico-chemical parameters, total dissolved solid (TDS), BOD, COD

INTRODUCTION

Water is nature's most wonderful, abundant and useful compound and it is the basis of all lives-ecological resources for the flora and fauna of our earth and a fundamental necessity for all lives. Water is one of the most important natural resources after air for human survival. The ground water (particularly from upper strata) is principal source of fresh water in the city of Mau. The rain water which infiltrates through soil dissolves more salt than corresponding surface water due to higher partial pressure of CO_2 in percolating water than surface water. Human beings have designed various methods to withdraw underground water for their daily needs. Dug wells, tube wells, hand pumps etc. are some of the methods used to extract ground water.

After monsoon and floods, and the seepage from sewer lines and septic tanks ground water gets polluted. Agitation also occurs in the underground water making the water colloidal and turbid. All these factors make water impotable. The physico-chemical character of ground water also has seasonal variability by two factors, firstly the seepage of pollutants by percolating water during rain and secondly by the dilution of groundwater during monsoon.

MATERIALS AND METHODS

The present investigation deals with the study of variations in physical and chemical parameters of groundwater due to monsoon qualitatively. For this purpose ground water samples were collected from 15 sites chosen randomly covering the entire city of Mau, the detail of sampling site is given in table-1. The samples were collected March-April 2011. The samples were collected in washed polypropylene bottles of 250 ml size. The colour of the samples was determined by visual comparison with the standard solution of known concentration using Platinum-Cobalt comparator. Odour of the samples was determined sniffing the samples and identifying the smell. Turbidity and transparency were determined by viewing the sample against white card board after passing light through it. Rests of the parameters were analyzed by standard methods prescribed in APHA (1985).

TABLE-1
DETAILS OF SAMPLING STATIONS

S. No.	LOCALITY	SAMPLING STATION
1	ASTUPURA	SS^1
2	AURANGABAD	SS^2
3	BALLIPURA	SS^3
4	BHITI	SS^4
5	BULATI PURA	SS^5
6	DAKSHIN TOLA	SS^6
7	GOLA BAZAR	SS^7
8	MALIK PURA	SS^8
9	MATHIYA TOLA	SS^9
10	MIRZA HADIPURA	SS^{10}
11	MUNSHI PURA	SS^{11}
12	NARAI BAGH	SS^{12}
13	NIZAMUDDINPURA	SS^{13}
14	RAGHUNATH PURA	SS^{14}
15	SHAHADATPURA	SS^{15}

RESULTS AND DISCUSSION

The result of the present study is summarized in the following table the details of city physico-chemical parameters were given in table 2.

TABLE-2
PHYSICO-CHEMICAL PARAMETERS

S. No.	Sampling Station	Colour	Odour	Turbidity	Transparency	TDS (in mg l^{-1})	Hardness (in mg l^{-1})	Calcium (in ppm)	pH	Chloride (in ppm)	COD	BOD
1	SS^1	Colourless	Odourless	Clear	Transparent	680	59	47	8.0	250	6.2	4.4
2	SS^2	Colourless	Odourless	Clear	Transparent	800	79	67	8.1	340	5.1	3.3
3	SS^3	Colourless	Odourless	Clear	Transparent	570	45	31	8.0	320	6.0	3.8
4	SS^4	Colourless	Fishy	Clear	Transparent	1030	78	65	8.2	390	10.1	7.2
5	SS^5	Colourless	Odourless	Slightly turbid	Transparent	740	84	69	7.3	290	6.3	4.2
6	SS^6	Colourless	Odourless	Clear	Transparent	590	37	32	7.6	350	5.2	3.6
7	SS^7	Colourless	Odourless	Clear	Transparent	830	24	23	7.8	230	4.1	2.9
8	SS^8	Colourless	Odourless	Clear	Transparent	790	49	41	7.8	380	4.4	3.0

9	SS[9]	Colourless	Odourless	Clear	Transparent	1020	110	87	7.1	430	4.3	3.1
10	SS[10]	Colourless	Odourless	Clear	Transparent	670	87	71	7.8	390	6.8	4.3
11	SS[11]	Colourless	Odourless	Clear	Transparent	630	14	12	7.0	150	4.0	2.5
12	SS[12]	Colourless	Odourless	Clear	Transparent	720	99	84	7.9	290	5.4	3.7
13	SS[13]	Colourless	Mouldy	Slightly turbid	Transparent	780	79	59	7.2	300	9.8	6.3
14	SS[14]	Colourless	Odourless	Clear	Transparent	730	72	59	7.4	360	6.3	4.2
15	SS[15]	Colourless	Odourless	Clear	Transparent	850	39	38	7.5	280	4.1	2.6

Most of the samples did not show colour hence it is colourless and transparent. Most of the samples are odourless. The odour is the first indication of organic matter pollution in ground water Jain *et al.,* (1996). TDS were high in samples; which varied from 570 mgl^{-1} to 1030 mgl^{-1} in samples collected. Thus the water is moderately hard as reported by Jha et al (2000). The concentration of calcium was within acceptable limits prescribed by ICMR (1985) and WHO (2005). The range of concentration of calcium in samples is showing variability in the range from 12 mgl^{-1} to 87 mgl^{-1} .The pH is above neutral samples and hence shows alkalinity. Chloride concentration was very high ranged between 150 mgl^{-1} and 430 mgl^{-1} in the collected samples Hem (1970). The values of COD and BOD were also reported to high, ranging from 4.0 to 10.1 and from 2.5 to 7.2 respectively.

CONCLUSION

On the basis of results of present study, the water of the Mau, particularly upper strata ground water which is taken out from ordinary hand pumps and dug wells are not good for its potability. Most of the parameters are beyond the acceptable limits prescribed by WHO (2005) and ICMR (1985). However, the parameters were not so high to cause acute toxicity and serious health hazard, but long term effects cannot be ruled out.

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