

Elemental, Microbial, Pesticide and Volatile Organic Component Analysis of Water near Rudrapur Areas in Uttarakhand

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Abstract

Water is an essential constituent of all animal and plants. Over 80% of earth surface is covered by water in form of lakes and river. The Ocean which accounts for most of the earth's water, contain and dilute electrolyte solution in which principal solute species are Na^+ and Cl^- ions. The other six ions Mg^{2+} , K^+ , Ca^{2+} , SO_4^{2-} , HCO_3^- and Br^- , accounts for more than 99% of the total dissolved solid in sea water. In, addition trace of the about 50 other inorganic ions and thousands of organic molecules are also present in sea water. Suitability of drinking water is necessary for living hood. Micronutrients which are essential part of drinking water, pesticides are majorly organophosphates and carbonates which causes health hazards and effect the nervous and endocrine system of body. Some are also postulated to be carcinogenic in nature. Volatile organic component are toxic to human body and can damage nervous system, lever as well as kidney. They can cause skin irritation are powerful carcinogens. The water samples are tested for elemental, microbial, pesticides and volatile organic components at five different locations at Rudrapur- Uttarakhand followed with standard methods and procedures.

Keywords: *Elemental, microbial, pesticide, volatile organic component, water, analysis, Rudrapur.*

1. Introduction

Water is the most important commodity for a man which has been exploited then other natural resources. Approximately 97% of total water exist in gigantic ocean and remaining 3% of water is distributed in form of ice sheet, underground, atmosphere, lakes, rivers and water contained in living organism. Which is generally used by evaporation and precipitation. Pollution of water has emerged as one of the most significant environmental problem. Water is less suitable for drinking, domestic, agriculture, industrial and wild life. The certain microorganism present in water,

specially pathogenic species causes diseases and men and animal and referred as biopollutant. Similarly heavy metal pollutions, pesticidal pollution, toxic organic pollution, oil pollution, thermal pollution etc Goel P.K. (2001). Due to water pollution not only in India, a large number of people die throughout the world.

2. Review of Literature

In India all available water sources are under the effect of pollution. The seasonal variation in physico-chemical and biological analysis of Moti lake, East Champaran, Bihar were also observed Sneha, R (2016). In which safe disposal of effluents is essential. The variation in total hardness, iron, chloride increase in pre monsoon probably due to the reduced ground water recharge in Rudrapur Goyal, R. et al (2016) High altitude Himalaya reason based sites are good for health in Srinagar-Uttarakhand Singh, S.et al (2014). Which have all water quality parameters lie in the range of drinking water. Sewage and domestic wastes, industrial effluents, agricultural discharge, fertilizers, detergents, toxic metals, siltation are major sources for water pollution Sharma, B.K. (2001).

3. Material and Methodology.

The water samples are collected as per standard procedures in the month of May-June from the selected sites in Rudrapur areas. They are analysed for various parameters-elemental, microbial, pesticides and volatile organic components. All water samples are collected in sample containers the list of sample collection areas in Rudrapur are given in Table -1 based on APHA (1995) methods by lab technician.

Instruments Used.

The fully automatic ICP spectrometer- ICP Technology, Membrane filtration- MA Technology fully automated GCMS-SBSE, fully automated GC-

FID-DNS are used to analysis for various constituents present in water samples at Whaters - Thiocare Lab, Navi Mumbai based on BIS (10500:2012).

4. Results And Discussion: The summary of results after analysis are listed below.

Table.1 List of sample collection in Rudrapur areas.

S.No.	Location	Source
1	Jal Sansthan(JSDW)	Drinking Water
2	Teen paani (TPRW)	River Water
3	Teen paani (TPGW)	Tube Well
4	Ganga Tat (GTRW)	Running Water
5	Kalyani View(KVRW)	River Water

Elemental Analysis:

Sr.No.	Elemental Test	Sample 1 JSDW	Sample 2 TPRW	Sample 3 TPGW	Sample 4 GTRW	Sample 5 KVRW	Max. Accept. BIS-10500:2012
1	Aluminium (Al)	0.01	<0.008	<0.008	<0.008	<0.008	0.03
2	Arsenic (As)	<0.001	<0.001	<0.001	<0.001	<0.001	0.01
3	Boron (B)	<0.063	<0.063	<0.063	<0.063	<0.063	0.5
4	Cadmium (Cd)	<0.001	<0.001	0.001	<0.001	<0.001	0.003
5	Calcium (Ca)	15.887	23.923	>100	77.68	79.946	75
6	Chromium (Cr)	<0.008	<0.008	<0.008	<0.008	<0.008	0.05
7	Copper (Cu)	<0.008	<0.008	<0.034	<0.008	0.025	0.05
8	Iron (Fe)	<0.063	<0.006	<0.063	<0.063	0.077	0.3
9	Lead (Pb)	0.001	<0.001	0.02	0.008	0.018	0.01
10	Magnesium(Mg)	4.284	6.329	33.445	37.004	26.029	30
11	Maganese (Mn)	<0.008	<0.008	0.028	0.158	0.126	0.1
12	Mercury (He)	<0.001	<0.001	<0.001	<0.001	<0.001	0.001
13	Molybdenum (Mo)	<0.008	<0.008	<0.008	<0.008	<0.008	0.07
14	Nickel (Ni)	<0.008	<0.008	0.017	0.009	0.011	0.002
15	Selenium (Se)	<0.001	<0.001	<0.001	<0.001	<0.001	0.01
16	Zinc (Zn)	<3.125	<3.125	<3.125	<3.125	<3.12	5

Microbiology Analysis

Sr.No.	Micro Biology Test	Sample 1 JSDW	Sample 2 TPRW	Sample 3 TPGW	Sample 4 GTRW	Sample 5 KVRW	Max. Accept. BIS-10500:2012
1	Coliform bact.	<300	<300	>300	>300	>300	Nil
2	E Coli bact.	100	150	>300	>300	>300	Nil

Pesticides Analysis

Sr.No.	Pesticides Test	Sample 1 JSDW	Sample 2 TPRW	Sample 3 TPGW	Sample 4 GTRW	Sample 5 KVRW	Max. Accept. BIS-10500:2012
1	Alchlor	<0.02	0.196	<0.02	<0.02	<0.02	20

2	Aldrin/Dieldrin	<0.02	0.03	<0.032	<0.02	<0.02	0.03
3	Alpha HCH	0.002	<0.02	<0.02	<0.02	<0.02	0.01
4	Atrazing	<0.02	0.001	<0.02	<0.02	<0.02	2
5	Beta HCH	0.003	0.001	<0.02	<0.02	<0.02	0.04
6	Butachlor	<0.02	0.031	<0.02	0.036	<0.036	125
7	Chlorpyriphos	<0.02	0.016	<0.02	<0.02	<0.02	30
8	DDT	<0.02	0.004	<0.02	<0.02	<0.02	1
9	Delta HCH	0.005	0.001	<0.02	<0.02	<0.02	0.04
10	Endosulphan	0.026	0.056	<0.024	0.23	<0.02	0.04
11	Ethion	0.017	0.001	<0.02	<0.02	<0.02	3
12	Gamma HCH	0.001	0.002	<0.02	<0.02	<0.02	2
13	Malathion	0.002	<0.02	<0.02	<0.02	<0.02	190
14	Methylparathion	<0.02	<0.02	<0.02	<0.02	0.029	0.3
15	Monocrotophos	0.018	<0.02	<0.02	<0.02	<0.02	1
16	Phorat	0.003	<0.02	<0.02	<0.02	<0.02	2

Volatile Organic Components Analysis

Sr. No.	VOC Test	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Max. Accept. as per EPA
		JSDW	TPRW	TPGW	GTRW	KVRW	
1	1,2-Dichlorobenzene	1.715µg/l	<1.25 µg/l	1.279 µg/l	<1.25 µg/l	<1.25 µg/l	5
2	1,2,4-Trimethylbenzene	1.6 µg/l	<1.25 µg/l	<1.25 µg/l	<1.25 µg/l	<1.25 µg/l	5
3	1,3-Dichlorobenzene	<1.25 µg/l	<1.25 µg/l	<1.25 µg/l	<1.25 µg/l	<1.25 µg/l	5
4	1,3,5-Trimethylbenzene	<1.25 µg/l	<1.25 µg/l	<1.25 µg/l	<1.25 µg/l	<1.25 µg/l	5
5	1,4-Dichlorobenzene	9.051 µg/l	<1.25 µg/l	<1.25 µg/l	<1.25 µg/l	<1.25 µg/l	5
6	2-Chlorotoluen	1.7 µg/l	<1.25 µg/l	1.18 µg/l	2.65 µg/l	<1.25 µg/l	5
7	4- Chlorotoluen	1.388 µg/l	<1.25 µg/l	<1.25 µg/l	<1.25 µg/l	<1.25 µg/l	5
8	Benzene	<1.25 µg/l	<1.25 µg/l	<1.25 µg/l	<1.25 µg/l	1.421	5
9	Bromobenzene	<1.25 µg/l	<1.25 µg/l	<1.25 µg/l	<1.25 µg/l	<1.25 µg/l	5
10	Ethyle benzene	1.26 µg/l	<1.25 µg/l	<1.25 µg/l	<1.25 µg/l	<1.25 µg/l	5
11	Isopropylbenzene	<1.25 µg/l	<1.25 µg/l	<1.25 µg/l	<1.25 µg/l	<1.25 µg/l	5
12	M- Xylene	<1.25 µg/l	<1.25 µg/l	<1.25 µg/l	<1.25 µg/l	<1.25 µg/l	5
13	N- Butylbenzen	<1.25 µg/l	<1.25 µg/l	<1.25 µg/l	<1.25 µg/l	<1.25 µg/l	5
14	O- Xylene	<1.25 µg/l	<1.25 µg/l	<1.25 µg/l	<1.25 µg/l	<1.25 µg/l	5
15	P- Xylene	<1.25 µg/l	<1.25 µg/l	<1.25 µg/l	<1.25 µg/l	<1.25 µg/l	5
16	Propyl benzen	<1.25 µg/l	<1.25 µg/l	<1.25 µg/l	1.542µg/l	<1.25 µg/l	5
17	Terbutyl benzene	1.992 µg/l	<1.25 µg/l	2.089µg/l	<1.25 µg/l	<1.25 µg/l	5
18	Toluene	<1.25 µg/l	<1.25 µg/l	<1.25 µg/l	<1.25 µg/l	2.081 µg/l	5

5. Conclusion

On the bases of this data we find that the drinking water provided by Jal Sansthan is drinkable which contain less amount of calcium and magnesium. Ground water and Ganga Tat high percentage of calcium and magnesium which may cause gastric problems and not good for health of human being. Other general aliment have very low percentage then the maximum acceptable limit. All water sources such as drinking water, ground water, river are infected of colifoam and e coli bacteria which requires need of boil water for drinking purpose and safety precaution from bacterial infections in the month of June to September. Poor sanitation can cause water to contain bacteria from human or animal waste. Very low quantity of presence of pesticide are present but all under the acceptable limit. Volatile organic compound are in negligible presence but all are also under the EPA limit.

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