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INVESTIGATION OF SOME TRACE ELEMENTS IN SURFACE WATER OF SIPAT AND ITS SURROUNDING AREA IN BILASPUR DISTRICT

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ABSTRACT

The paper deals with short review and the determination of three trace metals namely. Cu, Fe, Mn, in the ground water of different sites of Seepat, Bilaspur district of C.G. All activities carried out on the ground surface have direct or indirect impact on the ground water whether associated with urban, industrial or agricultural activities large scale concentrated source of pollutants, such as industrial discharges and sub surface Injection of chemicals and hazardous are obvious source of ground water pollutants. This study was carryout in the Month of during April and May 2014. The samples were collected from five different source of Bilaspur district of seepat villages. The results obtained are compared with safe limits in ppm for heavy metals laid down by BIS, WHO, ICMR, APHA.

Keywords: Heavy metals, Trace metals, pollution, Industrial discharge Ground water.

INTRODUCTION

Water is one of the very precious substances on the earth, it is very essential for the existence and survival of the life. As population grows in their need for water increases the pressure, the pressure on our ground water resources also increases. In many areas of the world, ground water is now being over extracted, in some places massively. So, the result is falling wafer levels and declining well yield, land subsidence and ecological damage, such as the drying out of wetland. The trace metal in water behaves in a typical manner. No single mechanism is sufficient to explain the process that are undergoing in the water. Trace metals like Fe, Mn, Cu, Zn, Co, Ni,etc., are very important for the proper functionary of the biological system and their deficiency or excess in the human system can lead number of disorders [1]. Other trace metals like Pb, As, Hg, etc., are not only biologically non essential but definitely toxic. The potential toxic metal elements, such as Cr, Pb, Cu, Zn, etc., are identified to cause health hazards in animal . In case of many heavy metals, bio-magnification occurs through food chain . So, it is necessary to discuss the theoretical aspects of trace metals for easy understanding of their metabolic activities.

Cu and Fe is mixed in groundwater by rocks bearing iron and copper bearing ores, namely cuprites, malachite, azurites, hematite, magnetite and iron pyrite. Fe in surface water is generally present in the ferric (Fe III) state. Concentrations of Fe greater than 1 mg/L have been reported to occur in groundwater . The average daily requirements of iron is considered to be 10 mg. Mn plays a role in the proper functioning of flavoroteins and in the synthesis of sulphated mucopoly-saccaharides, cholesterol, hemoglobin and in many other metabolic processes [2].

Trace elements in groundwater

Pollution of groundwater is an impairment of water quality by chemicals, heat or bacteria to a degree, that does not necessarily create and actual public health hazards, but does adversely affect such water for domestic, farm, municipal or industrial use [3]. Many trace elements are essential nutrients, however, certain trace elements, such as As, Cd, and Hg is known to be persistent environment contamination and toxic to most form of life. Trace elements are generally present in small concentration in natural water system. Their occurrence in groundwater and surface water can be due to natural

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sources, such as dissolution of naturally occurring minerals containing trace elements in the soil zone or the aquifer material or to human activities, such as mining, fuels, smog smelting of ores And improper disposal of industrial wastes.

Heavy metal Selected sites

Five water samples were collected from Sipat district in different sites in polyethylene containers which were thoroughly cleaned with 1:1 HNO3 rinsed several times with distilled water and dried in electric oven. The collected Water samples were grouped under categories S1, S2, S3, S4, S5.

Reagents

Only analytical reagent grade chemical were used.

Analytical procedure

APHA (Method were used for determination of all the trace metals)

RESULTS AND DISCUSSION

The distribution of some trace metals in SIPAT Surface water samples have been depicted in tables 1 and 2, respectively. Safe limits in ppm (as per BIS, WHO, ICMP, APHA) and minimum acceptable and maximum acceptable limits for drinking purpose use of groundwater and adverse effect on living bodies are show in table 3.



Table 1. Concentration of heav	y and trace metals in S	Sipat, Bilaspur district.
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Hoory Motola	Concentration				
neavy wietais	S ₁	S_2	S_3	S_4	S ₅
Copper	0.03	0.02	0.03	0.25	0.03
Iron	0.32	0.30	0.22	0.30	0.29
Magnesium	24	23	22	21	24
calcium	76	73	72	76	72
Nickel (as Ni)	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Boron (as B)	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Mercury (as Hg)	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Lead (as Pb)	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Zinc (as Zn)	0.22	0.20	0.18	0.21	0.17
Sodium	47	42	45	44	47
potassium	15	10	13	12	14

Table 2. Safe limits (as per APHA, WHO, BIS, ICMR) and minimum acceptable and maximum acceptable limits for drinking purpose use of ground water adverse effect on wring bodies, in ppm

Heavy metal	Ground water Max Min	Effect on lifting	
Copper as Cu	0.05 May be relaxed up to 1.5	Astringent taste but essential elements for metabolism, deficiency results is anemia in infants, excess may results in liver Damage.	

Iron	Iron 0.3 May be extended up to 1	Promote iron bacteria in water, bad taste, In trace is nutritional.
Manganese	Manganese 0.1 May be extended up to 0.5	Produce bad taste, essential as cofactor in enzyme system and metabolism process. Excess causes reduced hemoglobin.

DISCUSSION

The occurrence of trace elements in natural and ground water is affected both by hydro chemical factors, like mineral composition of the rocks, soil characteristics, etc., as well as by anthropogenic activities and likely to show both temporal and spatial variation.

Copper: According to limits prescribed by various authorities (WHO, ICMR, APHA, BIS)[4] it was found that all the samples collected from the sources were free from copper, the average value of copper in all water samples are much below the permissible limits but copper is excess in S6 sample.

Iron: According to BIS and ICMR the maximum allowable concentration and the permissible concentration in drinking water in 1.0 ppm and 0.3 ppm, respectively. It is content of hemoglobin, so it is very necessary for all living organism but in excess promote iron bacteria in water [5]. At least 60% of the population is still dependent on ground water sources for drinking purpose, especially in outer city and distant villages. According to the analysis of some water samples of Sipat, the manganese, Hg and zinc are not found under limit, but these metals are essentials for our body metabolism. They play role of cofactor in activity of enzyme.

Thus to keep ground water free from Cr, Fe, Mn, Pb, etc., and other ions the following recommendation should be taken in to account.

1. Chromium enriched refuge should be properly treated and then disposed off. Construction of ground water structure on dumping sites or its immediate vicinity should be avoided as Cr pollution relates to point source.

2. Industries should be set up their effluents treatment plants (ETP) independent or jointly as per norms and should remain effectively operational in order to safeguard the ground water for future generation.

3. In agricultural excessive use of nitrogenous and phosphates fertilizers should be avoided so that it does not leach down to ground water and deteriorates its quality.

4. Mass awareness should be generated about the over use of pesticides, its harmful effects on quality of water and human health.

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CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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