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A study of some toxic and trace elements in ground water of Datia block, Datia, (M.P.)

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ABSTRACT

Sixty (60) ground water samples collected from Datia Block were analyzed for Zinc, Iron., Manganese, , and Lithium. Average was found for Zinc, Iron., Manganese and Lithium were 0.013,0.075,0.026,0.017ppm respectively.

Key words: Zinc and ground water quality.

INTRODUCTION

Water is most essential to life next to air only.Safe drinking water is the primary need of every human beings.Village population mainly depends upon ground water sources.The quality of ground water depends on the ions which are dissolved in ground water.The ground water day by day get deteriorate or polluted due to contamination of chemicals as well as fertilizers which comes from factories and big farms as well as domestic effluents.

Zinc is a very essential micronutrient in human body but when present above permissible limits, it causes some toxic effect. Symptoms of zinc toxicity include irritability, loss of appetite, nausea; nuclear stiffness[1].The metal is reported to be bioaccumulated[2] into flora and fauna, creating ecological problems. The physiological importance of trace elements in agriculture is well known while some of the elements like iron manganese, zinc and copper are considered to be essential micro nutrients the elements like lithium and boron have been found to be toxic to plants even in small quantities beyond certain limits. In the present investigation an attempt has been made to determine the concentration of some trace element viz. zinc, iron, manganese and lithium.

MATERIAL AND METHODS

Sixty (60)samples water from different parts of the Datia Block were collected and analyzed for all major cations, anions, pH and E.C. the determination of trace elements was carried out by atomic absorption spectrophotometer. The water have been classified into 5 groups on the basis of electrical conductivity (micromhos percm at 25 °C) each class average , minimum and maximum concentration of each elements was determined .EC values of the ground water samples under investigation were measured using systronic EC meter.

RESULTS AND DISCUSSION

Zinc is essential in plant and animal metabolism but water is not a significant source of the elements in a dietary sense. Water quality

standard suggested by water quality criteria 1972(NAS-NAE1972) gave an upper limit of 5mg/L for zinc, be cause above that limit a significant number of people can detect zinc by taste. No health effects were Considered likely. Zinc is an undesirable contaminant for some species of aquatic life at much lower concentrations (NAS-NAE 1972p182) ,but the amount that can be tolerated is also a function of other properties of the solution. The maximum permissible limit for Zinc in drinking water, prescribed by W.H.O. is 5.0 ppm and I.S.I. has maximum limit 5-15 ppm. High in take may cause Diarrhea, Weight loss, hair loss. Zinc Values varied for ground water samples from 0.000ppm to 0.056 ppm. Iron is an essential element in the metabolism[3] of animal and plants .The undesirable effects of iron when present beyond the prescribed standards are, astringent taste, discolouration, turbidity[4], sedimentation and growth of iron bacteria .Long term exposure of iron beyond the limit produces toxic effects. A toxicity of hygienic significance is the motting of lungs. Siderosis and iron pigmentation are of low order of severity and usually require 6 to 10 years of exposure before digonosable change occur. The objection to the presence of iron in water is also aesthetic in nature .High concentration of iron also stains cloth [2-4].Most commonly occurring compound of iron in ground water is ferrous carbonate. The maximum permissible limit for Iron in Drinking water, prescribed by W.H.O. is 0.3-1.0 ppm,and I.S.I. has maximum limit 0.3 ppm. High in take may cause bacterial activity (redrot disease). Iron in ground water samples were varied from 0.000 ppm to 0.210 ppm.

Table 1:

E.C. Class and range	E.C. average Range	No of samples	Zinc A/M^N-M^X	Iron $A/M/^N$-M^X	Managanese $A/M/^N$-M^X	Lithium $A/M/^N$-M^X
C1(0-750)	585/410-750	8	0.00/NIL-0.002	0.120/0.045-0.210	0.022/NIL-0.058	0.003/NIL-0.010
C2(7501 500)	965/780-1400	13	0.030/NIL-0.056	0.013/NIL-0.040	0.014/NIL-0.021	0.013/0.002-0.030
C3(1500-2250)	1900/1580-2200	24	0.011/0.002-0.015	0.090/NIL-0.120	0.036/0.025-0.066	0.016/NIL-0.081
C4(2250-3000)	2765/2400-2950	10	0.010/0.001-0.036	0.070/0.010-0.095	0.027/.008-0.040	0.032/0.010-0.060
C5(>3000)	3150/3090-3250	5	0.008/NIL-0.016	0.098/NIL-0.200	0.016/NIL-0.025	0.032/NIL-0.080
TOTAL	1770/410-3250	60	0.013/NIL-0.056	0.075/NIL-0.210	0.026/NIL-0.066	0.017/NIL-0.081

All(Fe,Cu,Li,Mn,Zn) the values are in ppm except E.C., E.C. is in micromhos per cm at 25 ^{0}C , M^N=minimum value ,M^X=maximum value A= Average value

Manganese is an undesirable impurity in water supplies mainly owing to a tendency to deposit black oxide stains .The recommended upper limit for manganese in public watersupplies in the united states is 0.05 mg/L(NAS-NAE, 1972) no mandatory limit is specified for this element by the U.S. Environ mental protection agency .It is an essential element for both plant and animal life forms The maximum permissible limit for Manganese in drinking water, prescribed by W.H.O. is ppm and I.S.I. has maximum limit 0.1- 0.5 ppm. Its deficiency may cause in hibit growth disrupt to the nervous system and interfere with reproductive system. High in take may cause manganisum disease.The value of manganese in ground water samples were varied from 0.000ppm to 0.066ppm.

Lithium can be toxic[8] to plants according to Bradford (1963) citrus trees may be damaged by irrigation water containing 60 to 100 micro gram/ Liter .Lithium in ground water[9] samples were varied from 0.000ppm to 0.081 ppm..The maximum[12-16] concentration of Zinc ,Iron, Manganese and Lithium has been observed as 0.056,0.210,0.066,0.081ppm respectively.

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