

REPORT**Detection of Heavy Metal Ions in Different Samples of Water near Pen-Khopoli (Maharashtra)**

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Seven metallic parameters in drinking water from seven samples of different places near Penkhopoli (Maharashtra), India were monitored for six months and values obtained were compared with standards prescribed by Indian Council of Medical Research (ICMR) and World Health Organization (WHO).

Key Words: River water, Heavy metals, Pen-Khopoli (Maharashtra).

Generally, resources have been the need of most natural systems. Fresh water is necessary for life—human, animal and plant. River water is used for the development of an area and all development activities like urbanization, industrialization, construction and agriculture are dependent upon water. Most Indian rivers are polluted by domestic sewage and industrial waste. The heavy metals are of concern to man and his environment due to their high toxicity¹⁻⁵.

In the present study seven metals of ecotoxicological importance, *i.e.*, zinc, copper, arsenic, cadmium, lead, iron and nickel were analyzed by atomic absorption spectrophotometer.

Water samples were collected in January 2002. Samples were collected in 1 L polythene bottles initially washed with 6 N nitric acid and then washed with distilled water. The samples for heavy metals analysis were collected separately and acidified immediately after collection with 6 N HNO₃ (8 mL/L). Zinc, copper, arsenic, cadmium, lead, iron, nickel in water were analyzed by Shimadzu atomic absorption spectrophotometer (AA 646) using standard method⁶⁻⁸. All water samples were analyzed in March 2002.

Zinc: A representative set of observations pertaining to difference of zinc in all water samples is presented in Table-1.

The concentration of zinc in pond water, well water, river water and khadi water falls in the range below the detectable limit of 0.38 ppm. The highest concentration was found in before-ETP (effluent treatment plant) sample and lowest value in well water. The levels of zinc in all water samples are found within acceptable limits (2–10 ppm) for drinking water (ISI 1982) and irrigation water

Copper: The copper levels were found in the range 0.003–0.59 ppm. It can be observed from Table-1 that copper was higher in before-ETP sample. A comparison of water quality standards of copper for domestic use according to

ICMR with the existing limit shows that copper concentration in water sample except S₁ was not objectionable for domestic use as well as for irrigation.

Arsenic: Water samples collected from different places contained arsenic below the admissible limit (0.05 ppm). Higher concentration of arsenic was found in sample S₆ and lowest were found in samples S₁ and S₂. The presence of arsenic in water is the subject of serious concern due to its toxic properties.

Cadmium: In trace amounts, it acts as effective enzyme inhibitor. The maximum permissible concentration is 0.05 ppm according to WHO and ICMR. It was found that the values of cadmium in all the water samples was very much below the permissible limit.

Lead: Lead enters in the drinking water from industrial effluents and different wastes and household sewage. Toxic level of lead in human body is 500 ppm, beyond which it causes anemia, brain damage, vomiting. The maximum permissible concentration of lead in drinking water is 0.1 ppm, according to WHO and ICMR. The values of lead content in all water samples were below the maximum permissible level.

Iron: Iron in drinking water is present as Fe²⁺, Fe³⁺ in suspended form. It causes staining in clothes, imparts bitter taste. It comes into the drinking water from natural geological sources, industrial wastes and domestic discharges and also from byproducts. Excess amount of iron (more than 10 mg/kg) causes rapid increase in pulse rate and coagulation of blood in blood vessels, hypertension and drowsiness. The maximum allowable concentration of iron in drinking water is 1.0 mg/L according to WHO report. According to Indian Council of Medical Research (ICMR), the maximum allowable concentration of iron in irrigation and drinking water is 3.0 mg/L and 0.3 mg/L respectively. The average values of iron in all water samples are below the maximum allowable concentration. The concentration of iron in water samples of the study area ranges from 0.02 ppm to 2.90 ppm.

Nickel: Nickel concentration in the water samples was found in the range of 0.01 to 0.07 ppm.

The overall values of heavy metals in all the water samples are shown in Table-1.

TABLE-1
VALUES OF HEAVY METALS IN VARIOUS WATER SAMPLES

Sample No.	Zn	Cu	As	Cd	Pb	Fe	Ni
S ₁	1.35	0.590	0.010	0.010	0.010	0.900	0.07
S ₂	0.49	0.060	0.010	0.009	0.090	0.910	0.01
S ₃	0.11	0.005	0.007	0.008	0.080	0.360	0.01
S ₄	0.09	0.003	0.012	0.009	0.006	0.020	0.02
S ₅	0.14	0.040	0.011	0.010	0.100	0.012	0.01
S ₆	0.10	0.010	0.030	0.060	0.060	1.940	0.03

Metals are expressed in ppm.

S ₁	Before ETP*	S ₄	Well water
S ₂	After ETP	S ₅	River water
S ₃	Pond water	S ₆	Khadi water

*ETP—Effluent Treatment Plant

ACKNOWLEDGEMENT

The author is thankful to the Principal, Bhausaheb Nene Arts, Science and Commerce College, Pen-Raigad for providing laboratory facilities as well as encouragement during the present work.

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(Received: 31 December 2002; Accepted: 12 May 2003)

AJC-3134