JIRCMS Vol.: 02 II Issue 01 II Pages 01-24 II Jan 2018

Juxtaposition of physico-chemical parameters of ground water from Different hand pumps near Nimrana Industrial Area

Dr. Rajesh Kumar Yadav
Department of chemistry, R.R. (P.G.) College, Alwar (Raj.)

ABSTRACT: Nimrana is an industrial area of Alwar district. An industrial effluent discharged in to surrounding area contains toxic chemicals, hazardous compounds, dyes, biocides etc. Our study is aimed at, to monitor the overall pollution status of hand pump water of this area with special emphasis on physico-chemical parameter. Hand pumps are the dominant source for irrigation and drinking purposes, which is directly or indirectly damaged by the industrial discharge in the surrounding areas and nallah. An attempt has been made to determine the suitability of hand pump water of industrial, commercial and residential sites for drinking and other purposes with the help of statistical method in the form of standard deviation and composite index value. It has been observed that water of the some sites is highly contaminated. Finally some simple valuable suggestions and solutions are recommended for its mitigation in this study.

INTRODUCTION:

Nimrana industrial area of district Alwar is North-Eastern part of Rajasthan, situated between $26^0.22'$ to $27^0.83'$ North latitude and $76^0.53'$ to $78^0.17'$ East longitude. It is 110 meters above the sea level. The greatest problem that a peaceful world faces today is the maintenance of a harmony between the stabilized world population and environmental resources upon which the population depends. The most important among them is the management of water resources. Rajasthan is the largest state in the country in terms of geographical area with a population of 56.4 million. The state utilizes 1.9% of ground water of the country. On account of increase of population, urbanization, industrialization and wide spread use of fertilizers, pesticides in agriculture there is increasing degradation of surface and ground water quality. This results in a sharp decline in ground water table, which is an irreversible change. Nimrana industrial area is surrounded by a number of industries. Effluents from these industries pay a major role in polluting different water resources[11].

The present study gives the results of the chemical analysis of ground water samples from rural and urban areas of Nimrana industrial area in a mathematical way. The paper also suggests some solution to minimize the contaminants.

MATERIALS AND METHODS:

The samples were collected in plastic bottles at ten different sampling points of hand pumps. pH, DO and temperature were determined at the place of sampling. Water samples from hand pumps were collected after running them for 15 minutes. All samples were refrigerated at 4^0C in laboratory till the completion of analysis. All reagents were of analytical grade and solutions were made in distilled water. Various water quality parameters like pH, turbidity, TDS, EC, TA, TH, Cl^-, F^-, NO^-3, DO, BOD, COD were determined using standard analytical methods (APHA, AWWA and WPCF, 1995) [1]. The instruments used were calibrated before use for observing readings. The repeated measurements were made to ensure precision and accuracy of results. The values of different parameters of study area are given in table-1

RESULTS AND DISCUSSION:

The physico-chemical test were conducted employing standard scientific methods so as to minimize the determinate errors. Assessment of the water samples for pollution is made by comparison of the assessed values (table-1) of all the physico-chemical parameter of residential, commercial and industrial areas, with the corresponding standards prescribed for drinking water by various agencies like World Health Organization. (1984), I.C.M.R. (1975) and Bureau of Indian Standard (1983). Some of the water quality parameters are given in table2.In most of the cases no single variable is sufficient enough to portray some of the complex characteristics which are not directly observable. However with increasing complexity and vastness of observations the data presentation in tables is more cubersome and less informative. So in handling various kinds of data and to interpret them in

various ways statistical measures are used. To enhance the information of the data and proper interpretation a statistical method in the form of standard deviation and composite index value is determined as depicted in table 3. Based on these values water of various areas are classified as good, better, best & poor as shown in table 4.

$$S.D = \sqrt{\frac{\sum (X - X)^2}{N}}$$

Where S.D. = standard deviation X = sum of all values.

X = arithmetic mean N = total no. of variables

$$\text{Composite index} = \frac{\text{Gross value}}{N}$$

Gross value = Sum of variables

CONCLUSION AND SUGGESTIONS:

The present investigations have shown that the water of the some study area is highly contaminated with total dissolved solids. The presence of high TDS indicates that the water may have been polluted by domestic waste or other organic wastes. The content of TDS reduces solubility of oxygen, that's why amount of DO in most of the water samples was found in lower concentrations. At some sites, nitrate level is also found in higher concentrations. Which may be due to fertilizers waste. The hand pump water of study area is also found hard. Therefore, it is desirable to improve the water quality to make it potable. Hence, it is imperative that proper disinfection using scientific methods must be adopted before the water is allowed to the public water supply systems.

1. A proper flow in all pipes should be ascertained.
2. Industrial & community wastes should be treated before dumping into the water body.
3. The efficiency of the treatment plant should be monitored regularly.
4. Periodic monitoring of drinking water sources should be made.
5. Rain harvesting should be encouraged.

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