TechnoLEARN: An International Journal of Educational Technology
TechnoLEARN: **15**(02): 119-124, December 2025
DOI: 10.30954/2231-4105.02.2025.4
Peer Reviewed Journal

Investigating the Presence of Ions and Analyzing the Effectiveness in different Water Sources

Narendra Kumar Sharma

Department of Chemistry, Madhav University Aburoad, Pindwara, Sirohi, Rajasthan, India

Corresponding author: narendra.sharma@madhavuniversity.edu.in

Received: 11 Sept., 2025 **Revised:** 22 Nov., 2025 **Accepted:** 01 Dec., 2025

ABSTRACT

India was conducted in order to investigate the relationship between several physico-chemical characteristics. Using standard sample and estimation techniques, twelve water quality parameters were assessed for each site. When estimated values were compared to WHO guidelines, it became clear that the research area's water was contaminated, that water quality management was urgently needed, and that ten of the twelve water quality metrics that were examined had a significant correlation with it. It might be argued that regulating the conductivity of water is an effective way to check the quality of drinking water. The current study could be viewed as a step in the right direction for managing the quality of drinking water.

Keywords: Water quality parameters, regression equations, correlation, water quality management

The primary source of drinking water in our nation and a vital component of our existence is ground water. The quality of ground water is a serious issue. As a result, the water body's quality deteriorates to the point where it is unfit for its original use, such as enjoyment, bathing, and as a source of raw water (Biswas 2000; Wesley 2000; Khan *et al.* 2004). Only 1.6% of the 90% of dirty water that is provided to Indian towns and cities is treated, according to the Central Pollution Control Board. Thus, maintaining water quality is essential for human well-being (Gupta 1991; Madhuri *et al.* 2004).

How to cite this article: Sharma, N.K. (2025). Investigating the Presence of Ions and Analyzing the Effectiveness in different Water Sources. *TechnoLearn: An International Journal of Educational Technology*, **15**(02): 119-124.

Source of Support: None; **Conflict of Interest:** None

With a population of about 10 lacs, Morena is a C Class city in Madhya Pradesh. Morena is located close to Gwalior. It stretches from the northern Himalaya to the southern Chambal River. These include crushers, dye and paint factories, oil and sugar mills, JK Tyre Industry, water plants, wine mills, and several related ancillaries. The majority of these enterprises and various human activities are contributing to the increase of water pollution.

MATERIAL AND METHODS

Using standard sample and estimating techniques, thirteen distinct water quality physicochemical parameters, including conductivity, were measured at twelve distinct subterranean drinking water locations of various India Mark II (IM2) hand pumps (APHA 1995; Merck 1974). For quantitative analysis, all compounds of Anal R grade were utilized. The Century CP901 pH meter, RI 215 R conductivity meter, and Hach spectrophotometer 2010 were used to measure pH, turbidity, conductivity, and fluoride.

Table 1 provides a concise overview of the sampling locations used for the quantitative assessment of water quality parameters.

Table 1: Details of sampling sites

Sl. No.	Name of site	Location of site	Depth of boaring	Type of Source	Apparent water quality	Use of water
1	Hand pump at Kailaras bus stand	48 km south-west to Morena bus stand	Approx. 101 meter	Only source of water	colourless, turns yellowish on standing	Drinking, bathing, Crops etc.
2	Hand pump at Joura bus stand	27 km south-west to Morena bus stand	Approx. 98 meter	Only source of water	Colourless, odorless	Drinking, domestic, bathing Crops
3	Hand pump at Morena gaon	6 km south-west to Morena bus stand	Approx. 102 meter	Only source of water	Colourless, odorless	Drinking, bathing Crops etc.
4	Hand pump at Solanki petrol pump Morena	1 km south-west to Morena bus stand	Approx. 112 meter	Only source of water	Colourless, odorless	Drinking, domestic, bathing Crops etc.
5	Hand pump at Bilgaon bus stand	20 Morena bus stand	Approx. 99 meter	Only source of water	Colourless, odorless	Drinking, domestic, bathing Crops etc.

Karl Pearson's correlation coefficient, or r, is used to determine the relationship between two parameters, x and y. It is calculated as follows:

$$r = \frac{n\sum xy - \sum x \sum y}{\sqrt{\left[n\sum x^2 - \left(\sum x\right)^2\right]\left[n\sum y^2 - \left(\sum y\right)^2\right]}} \quad \ldots(1)$$

here, n = number of data points; x = values of x–variable; y = values of y–variable.

To evaluate the straight–line by line arregression, following equation of straight line can be used;

$$y = a\,x + b \quad \ldots(2)$$

here, y = dependent variable; x = independent variable; a = slope of line; b = intercept on y–axis.

$$a = \frac{n\sum xy - \sum x \sum y}{n\sum x^2 - \left(\sum x\right)^2} \quad \ldots(3)$$

And

$$b = y - \overline{a}\,\overline{x} \quad \ldots(4)$$

here, x = mean of all values of x; y = mean of all values of y.

Advantage for Agriculture Purpose

This type of water is useful for mustard , wheat ,cucumber, sugarcane etc.

RESULTS AND DISCUSSION

Table 2 (W.H.O.1984) shows the site-wise estimated values of thirteen water quality physico-chemical parameters along with the corresponding W.H.O. standards. Drinking water is contaminated according to all the indicators examined, and water quality management is critically needed in the research area, according to a comparison of estimated values for several parameters with WHO requirements. Using statistical regression analysis of the data in Table 2, the following regression equations were produced, with conductivity serving as the dependent variable for each of the twelve drinking water data points at Morena District, India.

Table 2: Site wise estimated values of water quality physicochemical parameters with their W.H.O. Standards

Sl. No.	Parameters	Site 1. I	Site 2 II	Site 3 No. I	Site 4 No.	Site 5.
1	Conductivity (μ Siemens/cm)	0.61	0.55	0.73	0.82	0.39
2	Temperature (°C)	24.5	26	25.5	25	25.4
3	pH value	7.55	7.22	7.72	7.82	7.65
4	Alkalinity (ppm)	229	195	180	201	167
5	Total	295	340	280	316	235
	Hardness (ppm)					
6	Total Solids (ppm)	410	420	564	765	564
7	Total	565	300	315	555	325
8	Biological	9.6	13	14	9	10.5
9	Chemical (ppm)	45	10	15	40	15
10	Calcium (ppm)	103	106	130	170	128
11	Chloride (ppm)	60	25	30	55	30
12	Iron (ppm)	1.4	1.2	1.5	1.8	1.3
13	Silica (ppm)	21	19	20	23	29

Conductivity = 0.191, Temperature + 5.471 n = 12 r = 0.825, F = 21.231, S = 0.09

here, n = number of data points; r = correlation coefficient;

F = variance ratio; S = standard error of estimate

Conductivity = +1.143; pH 8.169

n = 12, r = 0.900, F = 42.716, S = 0.07

Conductivity = +0.006; Alkalinity 0.410

n = 12, r = 0.910, F = 48.001, S = 0.07

Conductivity = +0.003; Total Hardness 0.007 n = 12, r = 0.912, F = 49.165, S = 0.07

Conductivity = +9.656; Total Solids + 0.082 n = 12, r = 0.969, F = 153.450, S = 0.04

The information about correlation studies among different physico-chemical parameters when conductivity is taken as a dependent variable is revealed by a critical and logical analysis of the regression equations above.

According to the regression coefficient, conductivity significantly correlates with eight water quality parameters: pH value, alkalinity, total hardness, total solids, total dissolved solids, chemical oxygen demand, calcium, and chloride content of water. 0.90, meaning that the data has a greater than 90% connection. This correlation value more than

0.90 i.e. there is more than 90% association in data. This correlation coefficient measures the degree of association or correlation that exists between two variables, one taken as dependent variable. The greater the value of regression coefficient, the better is the fit and more useful the regression variables. The values of variance ratio, *F* are high and standard error of estimate, *S* is low and these are also necessary requirements for significant correlation. Considerably significant correlation of conductivity with temperature and amount of iron in water with values of correlation coefficient, r more than 0.80 i.e. more than 80% association or correlation in data is also noticed during the regression analysis. The correlation of conductivity with biological oxygen demand and amount of silica in water is found to be insignificant with low values of variance ratio and high values of standard error of estimate.

low and these are also necessary requirements for significant correlation. Considerably significant correlation of conductivity with temperature and amount of iron in water with values of correlation coefficient, *r* more than 0.80 i.e. more than 80% association or correlation in data is also noticed during the regression analysis. The correlation of conductivity with biological oxygen demand and amount of silica in water is found to be insignificant with low values of variance ratio and high values of standard error of estimate.

It can be seen from the explanation above that conductivity is a crucial physico-chemical water quality metric. For all twelve data points, conductivity has a substantial association with 10 of the twelve characteristics examined. Temperature, pH, alkalinity, calcium, total solids, total dissolved solids, chemical oxygen demand, and the content of iron and chloride in the water are the parameters.

Using such a methodology will therefore greatly facilitate the task of rapid monitoring of the status of water pollution economically, which is the most important part of any pollution study to suggest some effective and economical way for water quality management, since other parameters and their functions can be explained by using these conditions. Based on the current study, it can be concluded with confidence that regulating the conductivity of the water may successfully check the quality of the subterranean drinking water in the study region. This conclusion can also be applied to the management of water quality in other study locations. The current study could be viewed as a step in the right direction for managing the quality of drinking water.

REFERENCES

APHA, 1995. Standard Methods for Examination of Water and Waste water, American Public Health Association ,Washington, D.C. 19th Edn.

Biswas, S.P. and Boruah, S. 2000. Ecology of the river Dolphin (Platanista Gangetica) in the upper Brahmaputra. *Hydrbiologia*, **430**: 97101.

Draper, N.R. and Smith, H. 1966. Applied Regression Analysis. Wiley, New York.

Gupta, S.C. 1991. Chemical character of ground waters in Nagpur district, Rajasthan. *Indian J. Environ. Hlth.*, **33**(3): 341349.

Khan, N., Mathur, A. and Mathur, R. 2004. A study on drinking water quality in Laskhar (Gwalior). *Indian J. Env. Prot.*, **25**(3): 222224.

Kumar, J., Jana, A.K., Bansal, A. and Garg, R. 2005. Development of correlation between BOD and COD for refinery waste. *Indian J. Env. Prot.*, **25**(5): 405409.

Madhuri, U., Srinivas, T. and Sirresha, K. 2004. A study on ground water quality in commercial area of Visakhapatnam. *Poll. Res.*, **23**(3): 565568.

Merck, E. 1974. The Testing of Water, Federal Republic of Germany, Darmstadt.

Mulla, J.G., Farooqui, M. and Zaheer, A. 2007. A correlation and regression equations among water quality parameters. *Int. J. Chem. Sci.*, **5**(2): 943952.

Snedecor, G.W. and Cohran, W.O. 1967. Statistical Method, The Lowa State University Press, Ames, 6th Edn.

Wesley Godwin, S. 2000. Bio-accumulation of heavy metals by industrial mollusks of Kanyakumari. *Water Poll. Res.*, **23**(1): 3740.

W.H.O. 1984. WHO Guidelines for Drinking Water, Geneva, Switzerland, Vol. 1.

Sharma, N.K. and Banshal, A. 2023. Analysis of Water Quality Parameters of Man Sagar Lake Jaipur Kanpur, *Philosopher*, **10**(5): 83-88.

Chauhan, S. and Sharma, N.K. 2022. Organic Farming: A Great Decision of Indian Farmers. *International Journal of Scientific Research and Growth*, **7**(2): 28-33.