

## Physicochemical Analysis of open well water Samples near Industrial Area of Niphad, Nashik District, (Maharashtra), India

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**Abstract:** The study was carried out to assess the well water quality in and around Niphad (Nashik District.)The quality was assessed in terms of physicochemical parameter .Well water samples were collected from eleven (11) villages in Niphad taluka, during month June 2012 to July 2012. The physicochemical parameters such as pH, Total Dissolved Solids (TDS), Total Solids (TS), Dissolved Oxygen (DO), Biochemical Oxygen Demand (BOD) , Total Alkalinity (TA), Total Hardness (TH), Calcium ( $Ca^{2+}$ ), Magnesium ( $Mg^{2+}$ ) Fluorides(F), Chloride( $Cl^-$ ), Sulphate ( $SO_4^{2-}$ ), were analyzed to know the present status of the well water quality. The results were compared with standards prescribed by ISI 10500-91. It was found that the well water was contaminated at few sampling sites. The remaining sampling sites shows physicochemical parameters within the water quality standards and the quality of water is good and it is fit for drinking purpose.

**Keywords:** Drinking water, Physicochemical study, Pollution study, Water quality parameters.

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### I. Introduction

Over 97% of the total water is available in ocean and other saline bodies, and is not readily usable. Of the remaining 3%, a little over 2% is in icecaps and glaciers, Groundwater is the major source of drinking water in both urban and rural areas. Besides, it is an important source of water for the agricultural and industrial sector. Up to last decade it was considered a dependable source of uncontaminated water. Fresh water has become a scarce commodity due to over exploitation and pollution of water. Increasing population and its necessities have lead to the deterioration of surface and sub surface water. Groundwater crisis is not the result of natural factors. It has been caused by human actions. Subsurface water sources are getting polluted due to developmental activities. In south areas of Nasik, particularly in Niphad taluka, there are sugar and wine industries. The effluents from these industries greatly distress the geochemistry of the soil. The discharged chemicals interact with ground water and affect the pH and other water quality. Hence the south areas of Nashik district were selected to study the effect of sanitary conditions on ground water quality. The social relevance of the problem has encouraged us in carrying out this work.

### II. Study Area

This study is concentrated on Niphad taluka of the Nashik district, Maharashtra (India) and the area is under heavy irrigation. Fertilizers and pesticides are used in a large amount which gets washed away in nearby river streams or percolate to well water. The whole taluka is covered by deccan trap. The soil of Niphad taluka is filled with disintegrated basalts of various shades from gray to black. This is favorable for the grapes, onions, vegetables, flowers and sugarcane. Sugarcane is one of its most important agricultural products and is the basis for its sugar refining and alcohol distilling industry. The black soil contains high alumina and carbonates of calcium and magnesium with variable amount of potash, low nitrogen and phosphorus. Niphad gets water supply mainly from groundwater that is open wells. These water sources are used for drinking, irrigation and industrial purpose. Location of study area is shown in figure A.

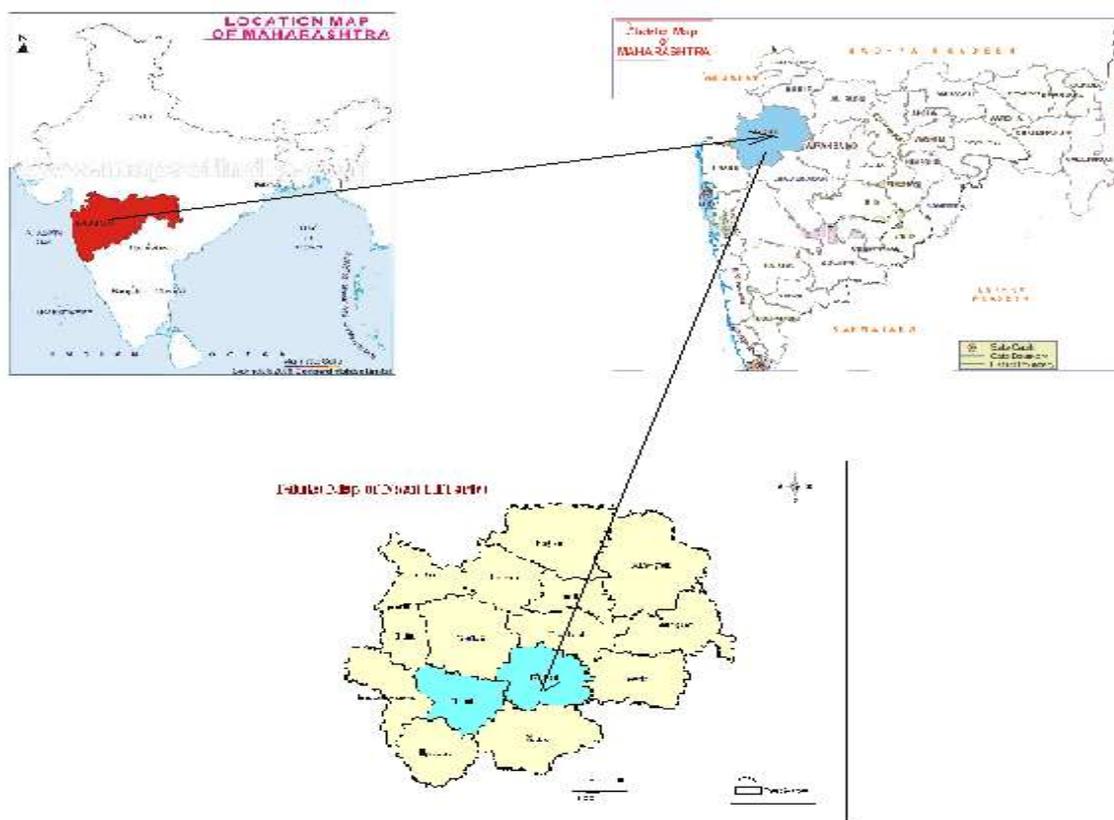


Figure A: Location map of Nashik and Niphad Taluka of Maharashtra, India

### III. Materials And Methods

All underground water samples are collected from open wells in different parts of the study area during pre-monsoon 2012 season and analyzed for their chemistry. The containers used for sample collection are polythene containers of capacity two liters. These containers were thoroughly cleaned, washed with dilute nitric acid and rinsed before collection. During the present study some of the physical and chemical parameters were determined. The measurement of temperature, pH and Total Dissolved Solids were taken in the field, immediately after the collection of samples using portable water quality analyzer Chloride, Hardness, Calcium, Magnesium, Total Alkalinity were analyzed by titrimetry, Fluoride, Sulphates were done by the UV Spectrophotometer. Standard procedures used in groundwater analysis are given in Table 1 and Location of sampling stations was given in Table 2.

Table 1: Unit, Method of Analysis of Each Parameter

Sr.No	Parameter	Unit	Method
1.	Temperature	$^{\circ}\text{C}$	Thermometer
2.	pH	---	Potentiometric Method
3.	TDS	mg/l	Gravimetric Method
4.	TS	mg/l	Gravimetric Method
5.	TH	mg/l	EDTA Titrimetric Method
6.	$\text{Ca}^{2+}$	mg/l	EDTA Titrimetric Method
7.	$\text{Cl}^{-}$	mg/l	Argentometric Titration Method
8.	$\text{F}^{-}$	mg/l	Spectrophotometric Method
9.	$\text{SO}_4^{2-}$	mg/l	Spectrophotometric Method
10.	D.O	mg/l	Titrimetric Method
11.	B.O.D	mg/l	Titrimetric Method
12.	$\text{Mg}^{2+}$	mg/l	Titrimetric Method
13.	Total alkalinity	mg/l	Titrimetric Method

**Table 2: Location of Sampling Stations**

Sr.No	Location	Land Use	Sr.No	Location	Land Use
1.	Chandori	Agricultural	7.	Palkhed	Agricultural
2.	Chitegaon	Agricultural	8.	Pimpalgaon-	Residential
3.	Kasabe-sukene	Agricultural	9.	Shirwade -Wani	Agricultural
4.	Kokangaon	Agricultural	10.	Sayyad -Pimpri	Agricultural
5.	Niphad	Industrial	11.	Sawargaon	Residential
6.	Saikheda	Residential			

Total sampling sites. =11

**Table 3: Indian Standard Specifications for drinking water IS 10500**

Sr .No	Parameter	Required Desirable Limit	Remarks
1	Temperature	-----	-----
2	pH	6.5 to 8.5	May be relaxed up to 9.2 in the absence
3	TDS	500	May be extended up to 2000
4	TS		
5	TH	300	May be extended up to 600
6	Ca <sup>2+</sup>	75	May be extended up to 200
7.	Cl <sup>-</sup>	250	May be extended up to 1000
8	F <sup>-</sup>	0.6 to 1.2	If the limit is below 0.6 water should be rejected, Max. limit is extended to 1.5
9	SO <sub>4</sub> <sup>2-</sup>	150	May be extended up to 400
10	D.O	-----	-----
11	B.O.D	-----	-----
12	Mg <sup>2+</sup>	30	May be extended up to 100
13	Total alkalinity	200	May be extended up to 600.

#### IV. Experimental

##### Sample collection

Water samples from the selected sites were collected during June 2012-July 2012 and taken in pre-cleaned polyethylene bottles. The samples after collection were immediately placed in dark boxes and processed within 6 h of collection.

##### Physicochemical analysis

The collected samples were analyzed for major physical and chemical water quality parameters like pH, Total Dissolved solids (TDS), Total Hardness (TH), Ca<sup>2+</sup>, Mg<sup>2+</sup> as per the method Assessment of Ground Water Quality described in “Standard methods for the examination of water and wastewater American Public Health Association (APHA).The parameters present in the water sample can be calculated by using various methods3-4. The pH of all the water samples was determined using a pH meter. The chloride, total hardness and total alkalinity were estimated by the standard methods of water and waste waters.

#### V. Results and Discussion

The physicochemical data of the wells water sample collected in June 2012 and July- 2012 are recorded in table 3 respectively. The results of the samples vary with different collecting places because of the different nature of the soil contamination.

**Table 4: Water quality parameters of samples**

S r . N o	Parameter → Villages	T e m p. ↓	pH	TD S	TS	TH	Ca <sup>2+</sup>	Cl <sup>-</sup>	F-	SO <sub>4</sub> <sup>2-</sup>	D. O	B. O. D	M Mg <sup>2+</sup>	TA
1	Chandori	26	6.4	1029	1032	733.0	64.2	358.2	0.7	42.0	6.0	2.4	84.4	260.4

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2	Chitegaon	2 6	6.6	320	328	209.4	52.5	358. 2	0.7	28.0	4.7	2.4	97.7	133. 6
3	Kasabe-	2 5	6.3	979	992	994.8	134. 8	358. 2	0.7	96.0	3.9	3.2	128. 9	279
4	Kokangaon	2 5	6.3	113 0	113 2	1099. 5	181. 9	97.7	0.6	121. 0	5.6	2.3	164. 5	243. 5
5	Niphad	2 6	6.8	612	625	759.2	63.3	390. 8	0.6	16.0	3.5	2.8	62.2	225
6	Saikheda	2 5	6.7	320	328	602.1	56.1	97.7	0.6	10.0	5.9	3.1	22.2	172. 5
7	Palkhed	2 6	6.5	600	605	863.9	140. 2	358. 2	0.7	38.0	3.7	1.8	134. 5	170. 8
8	Pimpalgao	2 6	6.6	218	223	602.1	48.9	293. 1	0.7	107. 0	4.3	3.5	26.7	138. 8
9	Shirwade-	2 5	6.6	461	462	628.3	35.0	293. 1	0.6	76.0	3.1	1.4	93.0	199. 7
10	Sayyad-	2 5	6.8	294	296	392.7	56.1	423. 4	0.6	20.0	5.5	2.8	48.9	182. 8
11	Sawargaon	2 6	6.8	488	498	471.2	79.6	423. 4	0.7	51.0	5.5	3.2	62.2	160. 8

### VI. Conclusion:

The analysis of the open well water quality parameters from eleven different villages from Niphad taluka shows that the pH, TDS, Chloride, Total Hardness, Calcium Magnesium and BOD values are not well within the permissible limits. Average of alkalinity has exceeded the desirable limits which are due use of large amount of pesticides, fertilizers in land and percolation of industrial waste water affects the water quality. From the results of the present study it may be said that the groundwater of eleven villages from Niphad taluka is not fit for domestic and drinking purposes, need treatments to minimize the Contamination especially the alkalinity. There is need of an increasing awareness among the people to maintain the groundwater at their highest quality and purity levels and the present study may prove to be useful in achieving the same.

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