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**STUDIES OF PHYSICO-CHEMICAL PARAMETER TO EVALUATE QUALITY OF  
WATER AT DIFFERENT ZONES OF NALAGONDA DISTRICT OF TELANGANA,  
INDIA**

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**ABSTRACT**

The objective of this research is to study the Physico-chemical parameters of water by sampling Hand pump, Bore well, Vagu and Cheruvu water of 6 selected sites of Polkampally, Ghanapuram, Kodhandapuram, Mallaiahpallem, Nimalipuram, Pinnavura of Nalgonda district of Telangana, India. The variation of physical and chemical parameters such as temp, pH, Total Dissolved Solids (TDS), Specific Conductivity and CO<sub>3</sub>, Ca, Cl, F, SO<sub>4</sub>, Mg, Na, K and NO<sub>3</sub> ratio in water were analysed for a period of one year. All parameters were within the permissible limits. From the result it was found that water of Polkampally Vagu was marginal for agriculture and other sources of water was probably safe or it can be used for domestic or irrigation purpose. Therefore it offers as a significant value to physio-chemical water quality standards.

**Keywords: Physiochemical parameters, water quality standards, Total Dissolved Solids (TDS), Specific Conductivity**

**INTRODUCTION**

Ecosystem known as lifeline of earth with most significantly use of water compound. Quality of water can be described by physical, chemical and biological characteristics. But some correlation was possible among these parameters and the significant one would be useful to indicate quality of water. Due to increased human

population, industrialization, use of fertilizers in agriculture and man-made activity. The natural aquatic resources are causing heavy and varied pollution in aquatic. Environment leading to water quality and depletion of aquatic Biota. It is therefore necessary that the quality of drinking water should be checked at regular

time interval because due to use of contaminated drinking water, human population suffers from a variety of water borne diseases. It is difficult to understand the biological phenomena fully because the chemistry of water reveals much about the metabolism. The ecosystem and explain the general hydro biological relationship. The physico-chemical parameters of water and the dependence of all life process of these factors make it desirable to take as an environment. It is therefore necessary that the quality of drinking water should be checked at regular time of interval, because due to use of contaminated drinking water, human population suffers from varied of water borne diseases. It is difficult to understand the biological phenomena fully because the chemistry of water reveals much about the metabolism of the ecosystem and explain the general hydro - biological relationship.

In Present Study involves the Analysis of water quality in terms of physico-chemical parameters of six sites Polkampally, Ghanapuram, Kodhandapuram, Mallaiahpallem, Nimalipuram, Pinnavura of Nalgondadistrict. It is located in Nalgonda district, Telangana. water samples of these sites are basically used for domestic and agriculture purpose.

## **MATERIALS AND METHODS**

Water sample were collected in polythene bottle from Hand pump, Bore well, Open well, Vagu and Cheruvu from Polkampally, Ghanapuram, Kodhandapuram, Mallaiahpallem, Nimalipuram and Pinnavura of Nalgonda District. Water sample were collected and brought in to laboratory for the analysis of various Physical- Chemical Parameters-pH, Specific Conductivity, TDS, Carbonate, Nitrate, Calcium, Magnesium, Sulphate, Chloride, Fluoride, and Sodium. We checked all parameters for the permissible limits. All parameters were checked in rainy season of July, 2014.

### **A) pH**

In present study pH value were found between (7.29-8.35). It shows the alkalinity of water sample through the periods. The high value of pH due to deposition of sewage and agriculture waste. pH value is essential for the growth of aquatic flora.

### **B) CONDUCTIVITY**

The conductivity of water range from (529-3070) at 25<sup>0</sup>C. The correlation between conductivity and physio-chemical parameters were beneficial for understanding the quality of water. It can measured by controlling the conductivity of water by EC meter. The conductivity of water sample were observed by standardized with KCL solution through standard instrument.

**C) SODIUM ABSORPTION RATIO**

In present study the SAR ratio is between (1.25-5.53). SAR is an acceptability of water for agriculture purpose. SAR ratio were analysis by the concentration of total solid in the water. If the SAR ratio were higher it is less satisfactory for irrigation. High SAR ratio will damage the quality of soil. Its sodium ratio decreases the calcium and magnesium from the soil.

**D) TOTAL DISSOLVE OXYGEN**

Total dissolved oxygen range(339-1965)mg/l. TDS were affected by the deposition of sewage and agriculture wastes. TDS analysis are the significant association for monitoring the quality of water.

**E) CARBONATE**

The values of carbonate fluctuates from (0-40)mg/l and (0.00-0.80)ppm. In water sample high pH shows the presence of carbonate if the pH is reduced it shows the conversion of carbonate into bicarbonate. It can be examine with the help of titration by standardised HCl using phenolphthalein as indicator.

**F) CHLORIDE**

The values of Chloride (40-560)mg/l and (1.41-15.79) ppm. It is examine by titrate the know value of sample by standardized silver nitrate solution using potassium chromate solution in water.

**G) FLUORIDE**

The values of fluoride range from (0.37-2.05)mg/l. The presence of fluoride observe by assimilation of rocks or minerals by surrounding of water bodies.

**H) NITRATE**

The values of nitrate ranges from (0.40-72.00)mg/l and (0.03-5.14) ppm. The presence of N<sub>2</sub> compound in water sample by the domestic effluents and factories chemicals. It is estimated by Spectrophotometric methods.

**I) SULPHATE**

The values of Sulphate ranges from (59-366) mg/l and (1.23-7.63) ppm. Sometime sulphate ions are present naturally in water or addition of industrial effluents.

**J) SODIUM**

The value of Sodium estimated by flame-photometer. In this study the range of sodium obtained between (38-374) mg/l and (1.67-16.27) ppm.

**K) POTASSIUM-**

The value of potassium ranges between (1.21-132.1)mg/l and (0.03-3.51) ppm. It was estimated by flame-photometer.

**L) CALCIUM**

The value of calcium ranges observed between (16-120) mg/l and (0.80-6.00) ppm. It was estimated by titration.

**M) MAGNISUM**

The value of magnesium observed between (5-102) mg/l and (0.40-8.40) ppm. It was

estimated by titration through EDTA standard.

## RESULTS

Table 1: Lab, Place, Sample Collection Medium, Dates and Latitude/Longitude Details

S. No.	Lab. No.	Particulars of the Sample Village/Mandal	Location of Well	Date of Collection	Latitude / Longitude
1	1860	Polkampally/Peddavura	Hand pump	22..07.2014	164542.773N 790748.238E
2	1861	Polkampally/Peddavura	Bore well	22..07.2014	164541.560N 790750.225E
3	1862	Polkampally/Peddavura	Open well	22..07.2014	164528.901N 790745.500E
4	1863	Polkampally/Peddavura	Vagu	22..07.2014	164521.735N 790747.871E
5	1864	Ghanapuram/Peddavura	Hand pump	22..07.2014	164420.075N 790720.596E
6	1865	Ghanapuram/Peddavura	Cheruvu	22..07.2014	164417.707N 790723.459E
7	1866	Ghanapuram/Peddavura	Bore well	22..07.2014	164425.364N 790712.483E
8	1867	Kodhandapuram/Peddavura	Cheruvu	22..07.2014	164342.015N 790828.204E
9	1868	Kodhandapuram/Peddavura	Hand pump	22..07.2014	164342.591N 790833.003E
10	1869	Kodhandapuram/Peddavura	Open well	22..07.2014	164343.257N 790834.054E
11	1870	Mallaiahpallem(or) Madhapuram/Peddavura	Hand pump	22..07.2014	164436.535N 790923.925E
12	1871	Mallaiahpallem(or) Madhapuram/Peddavura	Hand pump	22..07.2014	164437.795N 790926.861E
13	1872	Mallaiahpallem(or) Madhapuram/Peddavura	Bore well	22..07.2014	164436.621N 790928.181E
14	1873	Mallaiahpallem(or) Madhapuram/Peddavura	Open well	22..07.2014	164434.979N 790928.178E
15	1874	Nemalipuram/Peddavura	Cheruvu	22..07.2014	164353.251N 790900.830E
16	1875	Nemalipuram/Peddavura	Hand pump	22..07.2014	164342.231N 790859.352E
17	1876	Pinnavura/Peddavura	Cheruvu	22..07.2014	164334.991N 791044.115E
18	1877	Pinnavura/Peddavura	Vagu	22..07.2014	164354.755N 791043.161E
19	1878	Pinnavura/Peddavura		22..07.2014	164325.755N 791051.048E
20	1879	Pinnavura/Peddavura		22..07.2014	164322.437N 791053.015E

Table 2: Physical (pH, SP Conductivity &amp; TDS) parameter of Nalgonda district water sample

S. No.	Lab No.	pH	SP Conductivity at 25oC	TDS Calculated mg/l
BIS Permissible Limits		6.50 to 8.50	< 750=Good 750 to 1500=Safe 1500 to 2250= Permissible >3000 U.S.	500-2000
1.	1860	7.78	2120	1357
2.	1861	8.19	1541	986
3.	1862	7.91	785	502
4.	1863	8.30	1185	758
5.	1864	7.91	1547	990
6.	1865	7.96	951	609
7.	1866	7.71	2790	1786

8.	1867	8.24	529	339
9.	1868	7.91	1023	655
10.	1869	7.78	1146	733
11.	1870	7.69	1071	685
12.	1871	7.88	1030	659
13.	1872	7.74	1245	797
14.	1873	7.81	1311	839
15.	1874	7.67	555	355
16.	1875	7.76	2030	1299
17.	1876	8.27	867	555
18.	1877	8.35	639	409
19.	1878		3070	1965
20.	1879		815	522

Table 3: Chemical (CO<sub>3</sub> as CaCO<sub>3</sub>, HCO<sub>3</sub> as CaCO<sub>3</sub>, Cl & F) parameter of Nalgonda district water sample

S.No.	Lab No.	CO <sub>3</sub> as CaCO <sub>3</sub>		HCO <sub>3</sub> as CaCO <sub>3</sub>		Cl		F
		mg/l.	ppm	mg/l.	ppm	mg/l.	ppm	mg/l.
<b>BIS Permissible Limits</b>		200-600		200-600		250-1000		1.0-1.5
1.	1860	0	0.00	183	3.65	300	8.46	1.89
2.	1861	0	0.00	365	7.30	140	3.95	1.39
3.	1862	0	0.00	182	3.63	100	2.82	0.78
4.	1863	40	0.80	272	5.44	130	3.67	2.05
5.	1864	0	0.00	202	4.04	250	7.05	1.00
6.	1865	0	0.00	212	4.23	110	3.10	1.33
7.	1866	0	0.00	308	6.16	400	11.28	0.47
8.	1867	0	0.00	108	2.15	60	1.69	0.64
9.	1868	0	0.00	230	4.59	120	3.38	1.61
10.	1869	0	0.00	260	5.19	120	3.38	1.59
11.	1870	0	0.00	218	4.35	120	3.38	1.27
12.	1871	0	0.00	198	3.96	140	3.95	1.03
13.	1872	0	0.00	200	4.00	180	5.08	0.92
14.	1873	0	0.00	238	4.77	180	5.08	0.99
15.	1874	0	0.00	135	2.69	50	1.41	0.73
16.	1875	0	0.00	295	5.90	260	7.33	0.55
17.	1876	0	0.00	229	4.57	80	2.26	1.40
18.	1877	40	0.80	156	3.12	40	1.13	0.97
19.	1878	0	0.00	284	5.69	560	15.79	0.37
20.	1879	0	0.00	185	3.69	80	2.26	0.52

Table 4: Chemical (NO<sub>3</sub> as N, SO<sub>4</sub> & Na) parameter of Nalgonda district water sample

S.No.	Lab No.	NO <sub>3</sub> as N		SO <sub>4</sub>		Na	
		mg/l.	ppm	mg/l.	ppm	mg/l.	ppm
<b>BIS Permissible Limits</b>		10.16		200-400		No Guidelines	No Guidelines
1.	1860	70.00	5.00	186	3.88	239	10.41
2.	1861	11.45	0.82	153	3.19	132	5.74
3.	1862	0.35	0.03	62	1.29	80	3.48
4.	1863	1.00	0.07	84	1.75	180	7.83
5.	1864	18.25	1.30	140	2.92	198	8.63
6.	1865	1.40	0.10	95	1.98	97	4.22
7.	1866	72.00	5.14	242	5.04	374	16.27
8.	1867	2.00	0.14	60	1.25	38	1.67
9.	1868	6.35	0.45	81	1.70	87	3.78
10.	1869	11.05	0.79	95	1.98	110	4.76
11.	1870	11.00	0.79	99.8	2.08	73	3.19
12.	1871	2.55	0.18	101	2.10	45	1.97
13.	1872	4.05	0.29	142	2.96	92	4.01
14.	1873	4.55	0.33	135	2.81	103	4.50
15.	1874	2.25	0.16	59	1.23	54	2.33
16.	1875	1.35	0.10	325	6.77	183	7.96
17.	1876	1.25	0.09	80	1.67	107	4.67

18.	1877	0.40	0.03	60	1.25	64	2.78
19.	1878	18.00	1.29	366	7.63	304	13.23
20.	1879	0.80	0.06	99	2.06	68	2.95

Table 5: Chemical (K, Ca, Mg & T.H. as CaCO<sub>3</sub>) parameter of Nalgonda district water sample

S.No.	Lab No.	K		Ca		Mg		T.H. as CaCO <sub>3</sub>
BIS Permissible Limits		mg/l.	ppm	mg/l.	ppm	mg/l.	ppm	mg/lit.
		No Guidelines		75-200		30-100		200-600
1.	1860	8.2	0.21	56	2.80	97	8.00	540
2.	1861	87	2.23	64	3.20	53	4.40	380
3.	1862	1.92	0.05	24	1.20	39	3.20	220
4.	1863	5.6	0.14	40	2.00	24	2.00	200
5.	1864	54.6	1.40	40	2.00	44	3.60	280
6.	1865	22.89	0.59	16	0.80	49	4.00	240
7.	1866	137.2	3.51	88	4.40	49	4.00	420
8.	1867	2.84	0.07	56	2.80	10	0.80	180
9.	1868	6.14	0.16	16	0.80	68	5.60	320
10.	1869	31.85	0.81	40	2.00	49	4.00	300
11.	1870	1.21	0.03	64	3.20	53	4.40	380
12.	1871	16.98	0.43	32	1.60	78	6.40	400
13.	1872	6.43	0.16	64	3.20	63	5.20	420
14.	1873	44.72	1.14	32	1.60	73	6.00	380
15.	1874	2.88	0.07	48	2.40	10	0.80	160
16.	1875	5.7	0.15	72	3.60	107	8.80	620
17.	1876	3.42	0.09	24	1.20	34	2.80	200
18.	1877	2.85	0.07	32	1.60	24	2.00	180
19.	1878	132.1	3.38	120	6.00	102	8.40	720
20.	1879	3.06	0.08	96	4.80	5	0.40	260

Table 6: Chemical (K, Ca, Mg & T.H. as CaCO<sub>3</sub>) parameter of Nalgonda district water sample

S.No.	Lab No.	Specific Conductivity and Sodium Adsorption Ratio	Classification	RSC meq/L	Classification
BIS Permissible Limits		0-10 (Excellent), 18 (Good), 18-27 (Doubtful), above 27 (U.S.)	10-	0-1.25 (P.S.), 1.26-2.5 (M.R.), 2.5 above (U.S)	
1.	1860	4.48	High, Low	-7.14	Probably safe
2.	1861	2.95	High, Low	-0.30	Probably safe
3.	1862	2.35	High, Low	-0.76	Probably safe
4.	1863	5.53	High, Low	2.24	Marginal (for agriculture)
5.	1864	5.16	High, Low	-1.55	Probably safe
6.	1865	2.73	High, Low	-0.56	Probably safe
7.	1866	7.94	High, Low	-2.24	Probably safe
8.	1867	1.25	Very High, Low	-1.45	Probably safe
9.	1868	2.11	Medium, Low	-1.80	Probably safe
10.	1869	2.75	High, Low	-0.81	Probably safe
11.	1870	1.64	High, Low	-3.24	Probably safe
12.	1871	0.99	High, Low	-4.03	Probably safe
13.	1872	1.96	High, Low	-4.40	Probably safe
14.	1873	2.31	High, Low	-2.83	Probably safe
15.	1874	1.84	High, Low	-0.51	Probably safe
16.	1875	3.20	Medium, Low	-6.50	Probably safe
17.	1876	3.30	High, Low	0.57	Probably safe
18.	1877	2.07	High, Low	0.32	Probably safe
19.	1878	4.93	Medium, Low	-8.71	Probably safe
20.	1879	1.83	High, Low	-1.50	Probably safe

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**CONCLUSION**

Water quality is dependent on the type of the pollutant added and the nature of mineral found at particular zone of Hand pump, Bore well, Vagu and Cheruvu water of 6 selected sites of Polkampally, Ghanapuram, Kodhandapuram, Mallaiahpallem, Nimalipuram, Pinnavura of Nalgonda district of Telangana, India. Monitoring of the water quality of ground water is done by collecting representative water samples and analysis of physicochemical characteristics of water samples at different locations of Nalgonda district. Estimation of water quality index through formulation of appropriate using method and evaluate the quality of different water by statistical analysis by physico-chemical properties. From the result it was found that water of Polkampally Vagu was marginal for agriculture and other sources of water was probably safe or it can be used for domestic or irrigation purpose. Therefore it offers as a significant value to physio-chemical water quality standards.

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