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Physico-Chemical Analysis of Drinking Water of Different Places- A Review

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Abstract: ***Water performs an essential position in human life. It is vital for industry, agriculture and human lifestyles. The healthy water ecosystem is based on the physico-chemical and microbial characteristics of water. Due to increase in industrialization, urbanization, agriculture activity and various human activities has boom the pollution of surface water and ground water sources. Drinking water is an important constituent in the life of all living organisms. Due to use of such contaminated drinking water, human population suffers from varied of water borne diseases. Therefore it is necessary to check the quality of drinking water at regular time interval. Also there is need to know details about specific physico-chemical parameters inclusive of color, temperature, acidity, hardness, pH, sulphate, chloride, DO, BOD, COD, alkalinity etc. used for testing of water quality. Heavy metals including Pb, Cr, Fe, Hg etc. are of unique concern as they produce water poisoning in aquatic animals. In this paper, different authors' papers are summarized on water quality analysis in different region, which is useful to understand the various treatment processes and parameters used in the study.***
Keywords: Drinking water, physico-chemical parameters, seasonal variation, water quality index, water quality analysis.

I. INTRODUCTION

Environmental pollution is the global difficulty of the day. The growth of industrial region is speedy and very fast therefore associated anthropogenic activities such as waste discharge from industries, transportation and domestic activities have also been increased. The domestic waste generated is directly comes in contact with different sites of water sources without any treatment. Also the continuous flow of waste water from agricultural area contaminates the water source of surrounding area. This entire problem impacts the water sources and ultimately human health. Water is one of the 3 primary components of the surroundings. It is one of the most crucial and maximum valuable natural resources. Therefore, there exists a near linkage between the water quality and the environment which bears a nearly significance for eco system.

Water is one of the most important constituent in the life of all living organisms from the most effective plant and microorganisms to the most complicated living system called human body. Hence access to safe drinking water is key to sustainable development and important to food manufacturing, quality fitness and poverty reduction. Safe drinking water is crucial to existence and a satisfactory safe supply must be made available to consumers. Water intended for human intake should not include pathogen germs or harmful chemicals; due to the fact water contaminated with microorganisms is the cause of epidemics. Risks of consuming contaminated water encompass sicknesses like cholera, diarrhea, typhoid, parasitic worm. The WHO revealed that seventy five percent of all illnesses in growing international locations stand up from polluted drinking water. Therefore, it is vital that the quality of drinking water must be checked at normal time interval. That is ideal drinking water isn't always a luxury however one of the most essential requirements of lifestyles itself.

Hence, water quality issues are often the most important thing for measuring gets right of entry to improved water sources. Acceptable quality of water shows the suitability of that drinking water in terms of its physical, chemical and bacteriological parameters. International and local organizations have mounted parameters to determine organic and physicochemical quality of drinking water.

II. LITERATURE REVIEW

Abdul Jabbar Kandhro, Ali Muhammad Rind, Abdul Aziz Mastoi, Khalida Faryal Almani, Sujo Meghwar, Muhib Ali Laghari, Muhammad Sohaib Rajpout [1] researched on physico-chemical assessment of surface and ground water for drinking purpose in Nawabshah city, Sindh, Pakistan. Samples were collected during the end of year 05 Dec, 2013 to 30 Jan, 2014 from the municipal water supply and underground water. A total 65 groundwater and 60 surface water samples (water supply scheme) were collected from different parts of the Nawabshah city. Various physico- chemical parameters of water samples had been analyzed at the field and in the laboratory. The results of parameters were observed within the ranges; pH 6.64-8.87, EC 240-10170 µS/cm and TDS 158-6050 mg/l, alkalinity 56-1225 mg/l, total hardness 84-1695 mg/l, chloride 32-1852 mg/l, sulfate 25-2170 mg/l. The concentration of essential metals was varied in the ranges; Na 34-1725 mg/l, Ca 26-515 mg/l, Mg 13-430 mg/l, K 2-92 mg/l respectively. The evaluation discovered that a number of ground water samples (70 %) showed their majority of

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parameters above the maximum permissible limits set via WHO. Therefore the ground water of Nawabshah city may not be considered as suitable for dinking purpose. However, out of 60 surface water samples from water supply scheme, only 4 water samples may be used for drinking purpose.

Ashok Kumar Tripathi, M. K. Bhatnagar, Prachi Bhatnagar, Neetesh Vyash [2] studied the physico-chemical assessment of surface water quality with respect to seasonal variation around Amarkantak Thermal Power Plant, Chachai, Madhya Pradesh, India. Total Fifteen numbers of water samples were collected followed by 5 samples in three seasons from different locations adjacent to Amarkantak thermal power plant and analyzed followed by summer, monsoon and winter seasons. The physico-chemical analyses of the samples were accomplished as per standard methodology prescribed in APHA, 1989 and BIS: 3025, 1987 (Reaffirmed 2003). Water samples were analyzed with standard laboratory practices for total 12 parameters such as pH, conductivity, turbidity, taste, odor, TDS, alkalinity, ca-hardness, mg-hardness, total hardness, chloride, silica concentration. After analysis of surface water sample, parameter values compared against the prescribed limits of BIS-10500:2012. From this study it is concluded that, not much significant seasonal variations had been observed for selected 12 parameters only, besides Turbidity. Therefore, with the help of results of physico-chemical evaluation it can be suggested that water can be used for domestic purpose after pre-treatment and purification of water by standard methodology as per CGWB and CPCB.

Adhena Ayaliew Werkneh, Belay Zimbelachew Medhanit, Angaw Kelemework Abay, Jemal Yimer Damte [3] represented the physico-chemical analyses of drinking water quality at Jigjiga city, Somali Region, Ethiopia. Tap water samples were collected from three active stations across the Jigjiga city in April 8, 2014. Various physico-chemical parameters such as temperature, pH, electrical conductivity, total dissolved solids and total hardness have been determined along different water quality profiles. The experimental procedures were carried out according to the international drinking water standards set via WHO (1999). The reported values of parameters like average temperature, pH, electrical conductivity, total dissolved solids and total hardness are 13.6^0 C, 7.4, 1.143 S/m, 571.67 mg/l and 362.67 mg/l in CaCO3 respectively. The results of analysis were compared with ISI standards. It shows that, all the parameters satisfy the minimum and maximum permissible limit for drinking water guidelines except the total hardness and electrical conductivity.

B Vijaya Lalitha, K Sai Tejaswini [4] carried out a study to assess the groundwater quality and its suitability for drinking in Vuyyuru, Krishna (dist.), Andhra Pradesh. In the present study, groundwater samples were collected from bore wells of ten sample stations in the Krishna delta region and are analyzed for concentrations. Groundwater is to be analyzed for different physico-chemical parameters inclusive of pH, Electrical conductivity (EC), Total dissolved solids (TDS), Alkalinity (TA), Total hardness (TH), Sulphate (SO4-2), Chloride (Cl), Nitrate (NO3-2), Iron (Fe), calcium (Ca) and magnesium (Mg). The concentrations of physical, chemical parameters in groundwater samples had been compared with the standard values set by the Bureau of Indian Standards (BIS) and World Health Organization (WHO). The weighted arithmetic index method is used to determine the water quality index. The conclusion of the analysis is that the groundwater in few locations of study area is good for drinking and lots of areas have water of poor quality. However it is suggested that the quality of water can be improved by use of treatments and it can be used for drinking purposes.

Dhirendra Mohan Joshi, Alok Kumar, and Namita Agrawal [5] conducted a systematic study to assess the water quality index of river Ganga for drinking purpose in Haridwar district. A total of 90 water samples had been collected from five sampling stations during different seasons over a period of two years that is November 2006 to October 2008. The samples were analyzed for various physicochemical parameters including temperature, velocity, pH, dissolved oxygen, free CO_2, C.O.D., B.O.D., total alkalinity, hardness, turbidity, electrical conductivity, total dissolved solids, total suspended solids, carbonate, bicarbonate, calcium, magnesium, sodium, potassium, nitrate, phosphate, chloride, sulphate. Eleven parameters have been taken for calculation of water quality index. Each parameter was compared with the standard desirable limit prescribed by different agencies. The analytical results of different physicochemical parameters shows that some parameters like pH, electrical conductivity, total dissolved solids, total suspended solids, turbidity and sodium have greater values than the standard limits in some water samples of the study areas. In the present study, water of river Ganga was found to be in excellent quality in winter season and of poor quality in rainy season. The WQI value increases from winter to summer and it again increases from summer time to rainy season. It was also reported that the quality of water in the year 2007 was better than in year 2008. The WQI increases in rainy season due to increased concentration of sodium and dissolved solids. From WQI values, it is recommended that further improvement is needed to treat the Ganga water at Haridwar.

Dinesh Kumar, Kamlesh Choure, Chandra *Gurnani*, Vikram Kumar, Shinam Mukhija [6] determined physico-chemical quality of drinking water in Hanumangarh district, Rajasthan India. A total 20 potable water samples were taken from Canal system of Northern Rajasthan (Indira Gandhi & Bhakra canal) and were subjected to physicochemical evaluation. The Physico-chemical parameters which have been analyzed include pH, Electrical Conductivity, Chloride, Sulphate, Calcium, Magnesium, Sodium, Potassium, Dissolved Oxygen and Biochemical Oxygen Demand. The pH of sample varied between 7.05-7.50 with electrical conductivity 0.31-0.52 mmho/cm. The lowest value of Chloride, 32.5mg/l was observed at one of the region. Sulfate, Calcium

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and Magnesium, DO & BOD have been found to variety between 10-13 mg/l, 1.70-4.97 meq/l, 1.19-3.19 meq/l, 5.15-9.79 mg/l & 4.12-4.86 mg/l respectively.

N. Rahmanian, Siti Hajar Bt Ali, M. Homayoonfard, N. J. Ali, M. Rehan, Y. Sadef, and A. S. Nizami [7] investigated physiochemical parameters to evaluate the drinking water quality in the state of Perak, Malaysia. A detailed physical and chemical analysis of samples taken from the tap water of residential and commercial areas of the state was carried out. A wide variety of parameters such as pH, turbidity, conductivity, total suspended solids (TSS), total dissolved solids (TDS), and heavy metals such as Cu, Zn, Mg, Fe, Cd, Pb, Cr, As, Hg, and Sn were analyzed for every water sample collected during winter and summer periods. The results of each parameter were compared with the standard values set by means of the World Health Organization (WHO) and local standards such as National Drinking Water Quality Standard (NDWQS). The values of each parameter had been discovered to be within the safe limits set by the WHO and NDWQS. Overall, the water from all of the locations became observed to be safe for drinking purpose.

Naeem Khan, Syed Tasleem Hussain, Javid Hussain, Nargis Jamila, Shabir Ahmed, Riaz Ullah, Zain Ullah and Abdus Saboor [8] carried out a detailed investigation of the drinking water sources of both urban and rural areas of Kohat district, Khyber Pakhtunkhwa, Pakistan to evaluate their suitability for drinking purpose. A total of 60 water samples were collected from different drinking water sources. It included 54 samples from the hand pumps, streams, tanks, tube wells and wells, at 15 sampling sites selected of the main population zones and 6 bottled water from the open market. All these samples were analyzed for physicochemical parameters such as pH, conductivity, total dissolved solids (TDS), total suspended solids (TSS), total solids (TS), chloride (Cl^-), calcium (Ca^{2+}), magnesium (Mg^{2+}), hardness, and alkalinity. The results of parameters compared with WHO and Pakistan standard values for drinking water and it shows variations from these standard values. Among the diverse resources, wells and tanks were particularly polluted and tube wells were found to be the maximum suitable source for drinking water. The main reason of this research was to create awareness among the people about study areas and to avoid utilization of infected water for drinking purpose.

R. Shyamala, M. Shanthi and P. Lalitha [9] researched on physicochemical analysis of bore well water samples of Telungupalayam place in Coimbatore district, Tamilnadu, India. The physicochemical parameters of ground water of 5 stations in Telungupalayam had been studied. The water samples were collected from the bore wells positioned in these stations throughout the months of January 2005 to March 2005. The depth of the bore wells ranged from 90-130 ft in these kinds of stations. The samples were analyzed for various water quality parameters which include pH, total dissolved solids, total hardness, total alkalinity, calcium, chloride and chemical oxygen demand (COD) according to standard procedures. As per results, parameters such as pH, chloride ion, total hardness, calcium and COD values are well within the permissible limits. The TDS of one sample station and also the average of alkalinity was exceeded the desirable limit which are due to improper drainage system of the dyeing units. From results it is observed that, the groundwater of Telungupalayam is fit for domestic and drinking purpose but there is need of some treatments to decrease the contamination especially the alkalinity. Suitable tips were made to enhance the quality of groundwater of Telungupalayam areas.

Shivaraju H. P. [10] studied physico-chemical and bacteriological analysis for the assessment of drinking water quality in the Mysore city. A total 16 water samples were collected from overhead tanks, which are located in different areas of city and as collected water samples were analyzed for the physico-chemical and bacteriological characteristics. These samples were collected in two series of 45 days time intervals for the duration of 3 month that is October to December. The samples were collected early morning 5:30 – 6:00 am by means of the use of available tapes under the overhead tanks in each area. Temperature and pH of water were determined during sample collection at sampling stations. As per physico-chemical parameters are concerned, the water was physically and chemically satisfied besides excess of iron, nitrate and nitrite content of over permissible limit in few areas (I, G, H, J, K, F, G, I). Moreover, the microbial characteristics were determined by MPN method and it became advised that consuming water inside the city were severely polluted by means of dangerous bacteria and unsafe for drinking purposes. The viable sources and reasons for the drinking water contamination in the Mysore city are reported and possible alternative strategies to control the drinking water contamination are suggested.

V.T. Patil and P. R. Patil [11] represented physicochemical evaluation of selected groundwater samples of Amalner town in Jalgaon district, Maharashtra, India. The samples were collected from two open well, two bore well and one municipal water sample during November 2007-February 2008. These samples were analyzed for various water quality parameters such as pH, electrical conductivity, total dissolved solids, turbidity, dissolved oxygen, total alkalinity, total hardness, calcium, magnesium, sodium, potassium, chloride, nitrate, sulphate, phosphate as per standard methods. The simple linear correlation analysis has been achieved to discover correlation between two examined parameters. The results were compared with standard values prescribed by WHO and ISI 10500-91. It was observed that the underground water was polluted at few sampling sites and at some sampling sites physicochemical parameters were within the desirable limits and the water quality is also good and it is suitable for drinking purpose. The values of correlation coefficients will guide to select proper treatment to minimize groundwater pollution.

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III. CONCLUSION

After surveying all of the above research articles, it can be concluded that, growing population and its necessities have cause the deterioration of quality of diverse surface and sub surface water sources. Hence it is very important and vital to check the water before it's far used for drinking purpose. Water must be tested with different physico-chemical parameters. Selection of parameters for checking out of water is only relies upon what quantity we want its quality and purity. So earlier than the use of water we must inspect qualitative evaluation of a few physicochemical parameters of water samples. This may be taken into consideration as reference for the society to get relied on information which is beneficial for making effective decision.

REFERENCES

[1] Abdul Jabbar Kandhro, Ali Muhammad Rind, Abdul Aziz Mastoi, Khalida Faryal Almani, Sujo Meghwar, Muhib Ali Laghari, Muhammad Sohaib Rajpout, "Physico-Chemical Assessment of Surface and Ground Water for Drinking Purpose in Nawabshah City, Sindh, Pakistan", American Journal of Environmental Protection, February 9, 2015, Vol. 4, No. 1, pp. 62-69

[2] Ashok Kumar Tripathi, M. K. Bhatnagar, Prachi Bhatnagar, Neetesh Vyash, "Physico-Chemical Assessment of Surface Water Quality With Respect to Seasonal Variation Around Amarkantak Thermal Power Plant, Chachai, Madhya Pradesh, India", IOSR Journal of Applied Chemistry, Volume 7, Issue 10 Ver. II. (Oct. 2014), PP 28-33, e-ISSN: 2278-5736

[3] Adhena Ayaliew Werkneh, Belay Zimbelachew Medhanit, Angaw Kelemework Abay, Jemal Yimer Damte, "Physico-chemical analysis of drinking water quality at Jigjiga City, Ethiopia", American Journal of Environmental Protection, Vol. 4, No. 1, 2015, pp. 29-32

[4] B Vijaya Lalitha, K Sai Tejaswini, "A study on assessment of groundwater quality and its suitability for drinking in Vuyyuru, Krishna (dist.), Andhra Pradesh", International Journal of Engineering Development and Research, Volume 5, Issue 2, ISSN: 2321-9939

[5] Dhirendra Mohan Joshi, Alok Kumar, and Namita Agrawal, "Studies on Physicochemical Parameters to Assess the Water Quality of River Ganga for Drinking Purpose in Haridwar District", Rasayan Journal of Chemistry, Vol.2, No.1 (2009), 195-203 ISSN: 0974-1496

[6] Dinesh Kumar, Kamlesh Choure, Chandra Gurnani, Vikram Kumar, Shinam Mukhija, "Physico-Chemical Analysis of Drinking Water in Hanumangarh District, Rajasthan India", International Journal of Emerging Trends in Science and Technology, Vol. 03, Issue: 10, October, ISSN 2348-9480

[7] N. Rahmanian, Siti Hajar Bt Ali, M. Homayoonfard, N. J. Ali, M. Rehan, Y. Sadef, and A. S. Nizami, "Analysis of Physiochemical Parameters to Evaluate the Drinking Water Quality in the State of Perak, Malaysia", Journal of Chemistry, Volume 2015

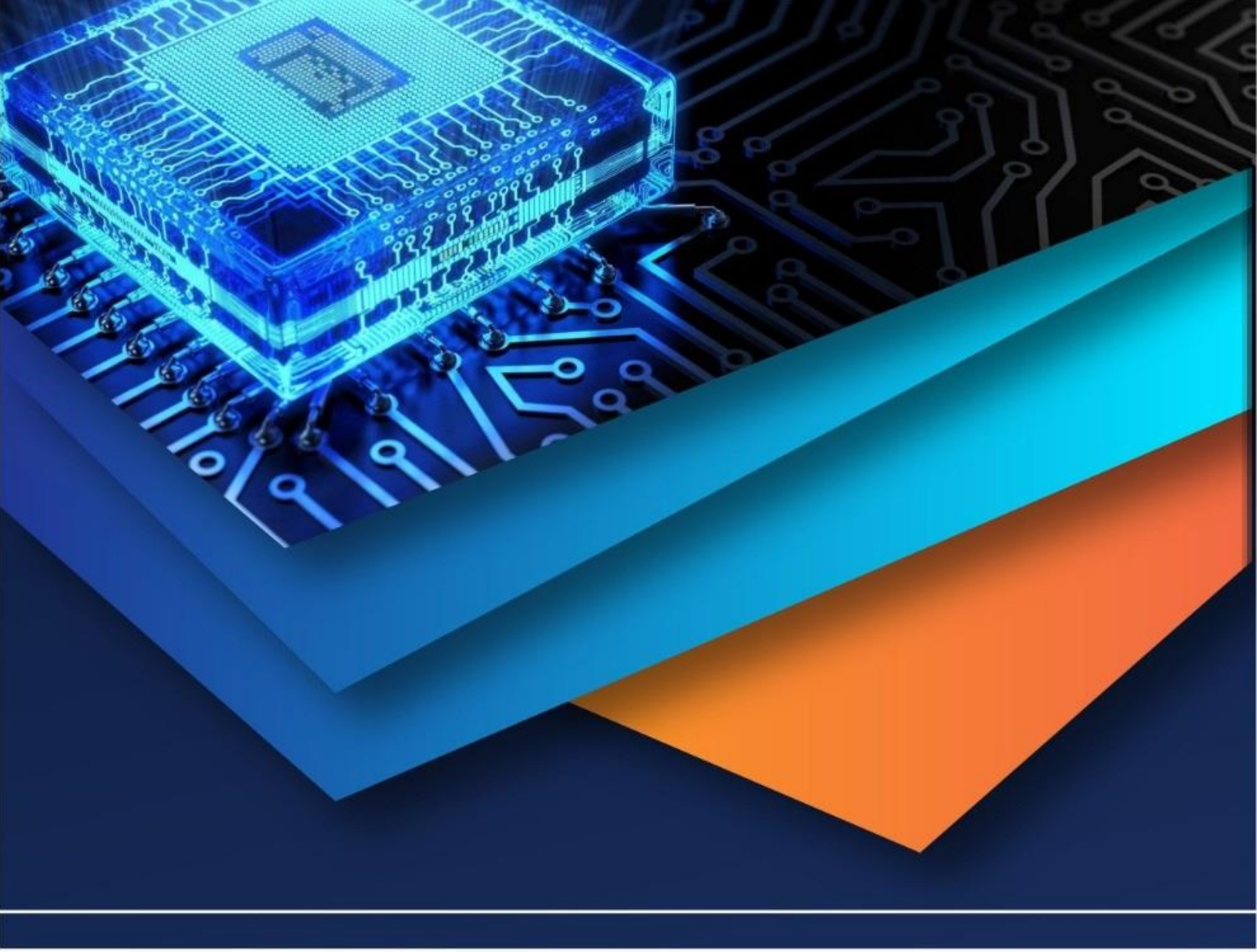
[8] Naeem Khan, Syed Tasleem Hussain, Javid Hussain, Nargis Jamila, Shabir Ahmed, Riaz Ullah1, Zain Ullah, and Abdus Saboor, " Physiochemical evaluation of the drinking water sources from district Kohat, Khyber Pakhtunkhwa, Pakistan", International Journal of Water Resources and Environmental Engineering, Vol. 4(10), pp. 302-313, October 2012, ISSN 2141-6613

[9] R. Shyamala, M. Shanthi and P.Lalitha, "Physicochemical Analysis of Borewell Water Samples of Telungupalayam Area in Coimbatore District, Tamilnadu, India", E-Journal of Chemistry, Vol. 5, No.4, pp. 924-929, October 2008, ISSN: 0973-4945

[10] Shivaraju H. P., "Assessment of Physico-Chemical and Bacteriological Parameters of Drinking Water in Mysore City, India", International Journal of Research in Chemistry and Environment, Vol. 2, Issue 1, January 2012(44-53), ISSN 2248-9649

[11] V. T. Patil and P. R. Patil, "Physicochemical Analysis of Selected Groundwater Samples of Amalner Town in Jalgaon District, Maharashtra, India", E-Journal of Chemistry, 2010, 7(1), 111-116, ISSN: 0973-4945

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