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# A study on Assessment of Physico chemical properties of water and wastewater

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*Abstract— Present era brings more threat to the environment. The scenario of the environmental hazard majorly concerned with the water and waste water contamination. This paper deals with the cluster of literatures for the scrutiny of various physico chemical parameters of water and wastewater. From the suggestions and results of the authors the paper concludes that the contamination of water and wastewater was almost higher than permissible limits and the presence of heavy metal was also abundant. Thus the treatment of both water and wastewater was highly recommended.*

*Index Terms—Environmental hazard, Heavy metal, Physicochemical parameters, Water and wastewater.*

## I. INTRODUCTION

The current scenario of sustainable environment is highly risk. Water, a vital component is needed by all the living organisms for all purposes. The objective of preservation of water, within each and every country has to be achieved by the increased concern about the water, which highly emphasis the quality of water. The Physico chemical analysis and traces of heavy metals such as lead, cadmium, zinc, copper, etc were highly toxic in nature which affects the bio life easily. The important source of the heavy metals in water is due to the discharge of wastewater from industries and other impurities, a major cause for environmental degradation and pollution. The increase in population is also a fact for hike of industries and other sectors. Present researches have extended for assessment of water qualities. Increase in industries like tannery, textile, paper, dying, etc., paved the way for the inspection of water. Water is mandatory for the functioning of biological system of entire living and non-living organisms the analysis of its physico chemical parameters such as turbidity, pH, temperature, alkalinity, TSS, TH, EC and heavy metals like Pb, Zn, Mg etc., is very essential. Serious issue is polluted water not only affects the surface water, river or lake water but also ground water. Hence both the ground and soil may not be used for agriculture and irrigation purposes. Therefore the study of physico chemical properties along with heavy metal concentrations in water increases world widely. Thus it is mandatory to study about these properties of water for esteemed life of bio- habitat.

## II. REVIEW OF LITERATURES

**E. Kulbat et al (2003)** studied on Heavy Metals Removal in the Mechanical-Biological Wastewater Treatment Plant “Wschód” in Gdańsk .This paper presented the results of investigations which had been carried out in 2000-2001. The research concerned the analysis of wastewater & sewage sludge from the “Wschód” wastewater treatment plant in Gdańsk, where the modified system UCT (MUCT) was used. It was showed indicated that the concentrations of 7 heavy metals (Zn, Cu, Pb, Cd, Cr, Ni, Ag) in wastewater were low. After the treatment, the metals concentration met criteria given by the Regulation of the Minister of Environmental Protection of Aug.1, 2002, that were valid at the time of the assessments. The Analysis of influence of metals removal amid wastewater treatment processed undoubtedly indicated that the fundamental role of biological treatment stage in metals were removal. The analysis of concentration of heavy metals in primary and biological sludge had been proved that the

sludge from the WWTP “Wschód” can be able to utilized in farming land and land reclamation (in accordance with the Regulation of the Minister of Environmental Protection of Aug.1, 2002). [1]

**P.G. Smitha et al (2007)** studied on Physico-chemical characteristics of water samples of Bantwal Taluk, south-western Karnataka, India.This present study analyzed of water samples collected from different sources like open wells, bore wells, streams, rivers and farm ponds of 20 villages of Bantwal taluk of Dakshina Kannada district, SW Karnataka had been carried out. The physical and chemical characteristics of this water showed that it were suitable for agricultural and irrigational purposes.[2]



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**Rizwan Ulla et al (2009)** studied on Assessment of groundwater contamination in an industrial city, Sialkot, Pakistan. This study had been designed to assess the groundwater quality in relation with heavy metal pollution and its implication to human health. The groundwater water samples were collected from 25 localities during October-November 2005 in the industrial city of Pakistan. Nearly 22 physiochemical parameters including pH, Temperature, Electric Conductivity (EC), Salinity, Total Dissolved Solids (TDS), Turbidity, Chloride (Cl), Sulfate (SO<sub>4</sub>), Total Hardness, Fluoride, Iodide, Ferric (Fe<sup>+3</sup>), Manganese (Mn), Nitrate (NO<sub>3</sub>), Alkalinity, Zinc (Zn), Total Chlorine, Lead (Pb), Iron (Fe), Nickel (Ni), Copper (Cu) and Chromium (Cr) were recorded. These results were compared with standard guidelines from WHO and Pakistan Standard Quality Control Authority (PSQCA) for groundwater quality. The Cluster Analysis (CA) were used, it grouped all sites into four zones based on their spatial similarities and dissimilarities of physiochemical properties. Zone 1 were highly contaminated with high level of turbidity, TDS, EC, SO<sub>4</sub>, Cl, Zn, total hardness, Pb and Fe concentrations were above the permissible levels of both WHO and PSQCA. in nineteen sampling sites Cr<sup>+6</sup> was detected. Factor Analysis (FA) and Discriminant Analysis (DA) revealed significant variables including pH, EC, SO<sub>4</sub>, NO<sub>3</sub>, Cl, TDS, Total Hardness, Fluoride, Iodide, Total Chlorine, alkalinity, Pb, Fe and Mn which were responsible for variations in the quality of groundwater and affect water chemistry. The results proved that the groundwater of the study area cannot be as considered good quality as it is highly turbid (57% of total sites) and with high levels of Pb, Fe and Zn which were above the standards of WHO and PSQCA permissible limits. Using Geographic Information System (GIS) the spatial distribution maps of water quality parameters were produced. By the use of distribution maps which served as an important information to understand ecological status of the groundwater systems and for the identification of quality parameters of groundwater with concentration above the allowable limits of World Health Organization and also to determine potential areas where water treatment plants and technologies can be targeted in Sialkot.[3]

**Deepali et al (2010)** studied on Metals Concentration in Textile and Tannery Effluents, Associated Soils and Ground Water. An inquisition has been made to ascertain the concentration of metals in the effluents and associated with soil and groundwater samples collected from various tannery and textile industries located near the Haridwar. The physicochemical examination for metallic parameters has been conducted by using spectrophotometer and Atomic absorption spectrometer (AAS). The outcome showed that all the metals such as Mn, Cr, Cu, Fe, Pb and Cd beat the standard limits in effluents of tannery and textile industries and the associated soil samples, while Chromium (Cr) contamination in groundwater samples were observed only in the samples collected from areas nearby tannery industries. The findings also indicated that the contamination of Cr was higher than other metals. The calculated metal levels in the soil and water were compared with the safe limits laid down by WHO. [4]

**Singh M. R et al (2010)** studied on Physico-chemical Properties of Water Samples from Manipur River System, India. An Assessment of physicochemical parameters had been carried out during April 2008 to March 2009 from 4 rivers namely the Manipur, Thoubal, Iril and Imphal located in Manipur, India. The Sites 1,2,3 and 4 were subjected to various anthropogenic activities of men, cursory through the urban residential areas while sites 2 and 3 from Manipur river were located in a forested watershed and free from human disturbances. The Maxima of conductivity 467 $\mu$ S/cm, TDS 870 mg/l, NO<sub>3</sub>-N 0.550 mg/l, K 9.00 mg/l and PO<sub>4</sub>-P 0.068 mg/l were recorded during rainy season while the maximum of free total alkalinity 168.0 mg/l, Chloride 42.63 mg/l, CO<sub>2</sub> 22.3 mg/l and total hardness 136.0 mg/l were observed during the summer from the rivers indicating degradation of water quality during these seasons. The values of free CO<sub>2</sub> beyond the maximum limit (22.30 mg/l) and DO were below the

minimum permissible limit (4.43 mg/l) during summer season at site 5. The values of the studied parameters were more during rainy season in Thoubal river followed by Iril, Imphal, and Manipur rivers. The results were indicated that most of the physical and chemical parameters from Manipur river system were within the limits of WHO for drinking.[5]

**R.R. Dinrifo et al (2010)** studied on Physico- Chemical Properties of Rain Water Collected from Some Industrial Areas of Lagos State Nigeria. This study had been carried out to determine the physicochemical properties of rainwater from 4 different industrial sites in Lagos State Nigeria. These rain water samples were collected from 4 locations (viz Ikeja, Odongunyan, Imota and Oshodi) of Lagos Metropolis, in the time of May, July and September 2009 and the rainwater samples were taken to the laboratory and analyzed. The first 3 locations were industrial



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layouts whereas the final one was a rural area on the outskirts of Lagos. The result assayed on the rainwater samples indicated that at the f4 locations average values were: turbidity (0.2, 0.25, 0.18 and 0.16 NTU); total hardness (21.3, 20.0, 20.0, 15.1 mg/l); chloride (15, 13.3, 14.3 and 11.1 mg/l); colour (7.0, 9.0, 6.7 and 5.0 Hazen units) respectively. The PH values of the samples from the 3 industrial locations showed slight acidity (ie PH < 6.5), particularly for the month of May 2009. This showed that it was possible to have acidic rain in these areas and thus suggested for immediate corrective actions.[6]

**M.R.Mahananda et al (2010)** studied on Physico-Chemical Analysis of Surface and Ground Water of Bargarh District, Orissa, India. The piece of investigation which were carried out to study the quality of ground water as well as surface water of Bargarh district of Orissa in India. The study area was situated at a height 176.362 mts above sea level and 59km to west of the district Sambalpur. The present work had been done for monitoring 2 types of ground water (dug well water and bore well water) of 10 wards of the town as well as three types of ponds, such as temple pond, large community pond & small community pond of the town. The Attempts were taken to study and analyze the physical and chemical characteristics of various parameters of water like pH, Alkalinity, Temperature, Total suspended solids, and Total dissolved solids, Chemical Oxygen Demand, Dissolved oxygen, Nitrate, Chloride, Potassium, Phosphate, Sodium, Fluoride, Total Coli forms (Pond water) etc. gave a picture of quality parameters in both the bore well and dug well water as well as pond water of the town. The observation of the result, concluded that these parameters which were taken for the study of water quality were below the pollution level of ground water which was to satisfy the requirement for the use of various purposes such as domestic, agricultural, industrial etc. But in case of the surface water, the water quality of small community pond were above the permissible limit.[7]

**P. Shanthi et al (2012)** studied on Physico chemical analysis of ground water near municipal solid waste dumping sites in coimbatore city. This paper assessed the physical and chemical parameters of groundwater in Coimbatore city. These groundwater samples were collected near the municipal solid waste dumping area during the rainy seasons 2011. These samples were studied for various physicochemical properties. A comparative study on ground water i.e. bore well and hand pump water were carried out by taking certain vital parameters such as pH, TS, TSS, TDS, TA, COD, Nitrate, Cl<sup>-</sup>, F<sup>-</sup> etc. In this present study it was founded that the maximum parameters were not at the level of pollution except few parameters like nitrate, TDS, TSS, TS and TH in ground water. Hence both the type of ground water satisfy the requirement for the use in. Therefore, the best accepted option was to avoid the possibility of polluting the groundwater resources. [8]

**Paula Popa et al (2012)** studied on Study of Physico-Chemical Characteristics of Wastewater in an Urban Agglomeration in Romania. This study investigated the level of wastewater pollution by analyzing its chemical characteristics at 5 wastewater collectors. The samples were collected before they discharge into the Danube during a monitoring campaign of 2 weeks. The Inorganic and Organic compounds, biogenic compounds and heavy metals, have been analyzed using potentiometric and spectrophotometric methods. The Experimental results shown that the quality of wastewater varies from site to site and it greatly depends on the origin of the wastewater. Correlation analysis were used in order to identify possible relationships between concentrations of various interpreted parameters, which could be used in selecting the appropriate method for wastewater treatment to be implemented at wastewater plants.[9]

**V.P. Kesalkar et al (2012)** studied on Physico-chemical characteristics of wastewater from Paper Industry. This paper presented the characteristics of wastewater taken from the paper industry in which waste-paper was used as a raw material. The wastewater from this paper industry had been characterized by extreme quantities of BOD, COD, pH, DO, TDS and SS, colour. The wastewater samples had been collected from the inlet and outlet of the effluent treatment plant in the paper mill. These samples were examined and compared with the effluent discharge of Indian standards. The raw wastewater consisted of Total Dissolved Solids ranges from 1043-1293mg/l, pH of 6.8-7.1, Suspended Solids of 1160-1380mg/l, BOD varies from 268 - 387 mg/l and COD varies 1110 - 1272 mg/l respectively. After the treatment, Total dissolved solids ranges from 807-984 mg/l, pH varies 7.1 - 7.3, Suspended Solids 322-505 mg/l BOD ranges from 176- 282 mg/l and COD and 799-1002 mg/l, respectively. The Result showed that the TDS and pH were in the permissible limits and BOD, COD, SS does not meet the permissible standards after treatment. The paper mill does not meet with the Standards set by Central Pollution Control Board of India. [10]



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**Nowara Tamanna Meghla et al (2013)** studied on Assessment of Physicochemical Properties of Water from the Turag River in Dhaka City, Bangladesh. A study had been conducted in the river of Turag River in Dhaka to get an idea about the water quality and its temporal changes over post monsoon, pre monsoon and monsoon seasons due to change of physicochemical parameters during the period from October 2011 to September 2012. The inspection demonstrated the present scenario of the water quality of the River Turag which has been highly polluted due to dumping of untreated waste of corporation and industrial directly. The contents of total phosphorus (P), nitrogen (N), hardness and alkalinity in the river water unevenly exceeded than the permissible limit of the standard values (EQS, 1997) in all seasons. Though the levels of pH, total dissolved solid (TDS), electric conductivity (EC), and cadmium (Cd) were highly outpace the standard level in both post and pre monsoon season but in monsoon they were under the permissible limit in the Turag River. The lowest concentration of dissolved oxygen (DO) and higher concentration of biological oxygen demand (BOD) were observed that severely harmed the aquatic organisms and destroyed their habitat in the river. Temperature, the contents of sodium (Na), potassium (K) and copper (Cu) were within the standard level in all seasons. The comparative study showed that the water quality of the Turag River were highly degraded due to the presence of significant amount of pollutants discharged from Dhaka city. This deterioration not only affects the aquatic organisms but also worse affects the entire ecosystem as well as the local people who depend on river water for their daily activities. [11]

**Neha Gupta et al (2013)** studied on Assessment of Physicochemical Properties of Yamuna River in Agra City. The present study was done to find out the physico-chemical properties of the river Yamuna water from 9 different sampling sites in the City of Agra. These water samples were collected from 9 locations (viz Runkata, Naire Ghat, Kailash Mandir, Etmad-ud-daula, Pohiya Ghat, Balkeshwar, Rambagh Hathi Ghat and Tajganj) of Agra City, during the months of March- April, 2011 and these river water samples were taken to the laboratory and examined. The analysis was done for the parameters like Total Dissolved Solids, Electrical Conductivity, Turbidity, pH, Total Hardness, Total Alkalinity, Calcium, Chloride and Magnesium. pH showed that the River water of Yamuna is alkaline in nature. Total Dissolved Solids and Turbidity was found above the permissible limits of WHO.[12]

**B.C. Behera et al (2014)** studied on Physico Chemical Properties of Water Sample Collected From Mangrove Ecosystem of Mahanadi River Delta, Odisha, India. This present study, investigated the physicochemical parameters of water samples which were compared with the water quality standard of BIS and pollution control board of the state. These variations of different parameters investigated as follows: dissolved oxygen (2.9-10.9 mg/L), pH (6.05-8.6), Temperature (24.2-30.9°C), TDS (4510-11900 mg/L), electrical conductivity (5.16-17.33 mS/cm), chloride content (4389-12575 mg/l), total hardness (800-2090 mg/l), calcium (125.4-400.8 mg/l), magnesium (153.16-474.13 mg/l), phosphate (0.55-2.59 mg/l), and nitrate (13.03-24.01 mg/l). Among different study sites with high load of calcium, nitrate, chloride and phosphate in most of the study sites indicated the pollution status of this estuarine water.[13]

### III. CONCLUSIONS

Water an important resource of bio life is highly affected due to increase in companies and textiles. Main heavy metals like lead, copper, mercury must at once be cleansed from groundwater. This paper is framed with 13 literatures the physico chemical properties of water. The need of water treatment must be persuaded in this aspect. Thus, concluding that water treatment must be highly recommended for future bio life.

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