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Dr. R. V. Bhole

**'Ravichandram' Survey No-101/1, Plot
No-23, Mundada Nagar, Jalgaon (M.S.)**



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CONTENTS

Sr. No.	Paper Title	Page No.
1	Agriculture Land Ownership in Socialist Economic System Dr. Rajshekhkar K. Nilendu	1-2
2	Regional Analysis of Sectoral Differentials in Literacy in Karnataka, India Dr. Suresh L. Chitragar	3-14
3	Library Technology- An Overview Basawaraj Malipatil	20-21
4	Applications of Schiff Bases and their Metal Complexes: A Review Nandkishor J. Suryawanshi	22-25
5	A Study of Stress in Women Police Constables in Pune City and its Impact on Physical and Mental Health Dr. Subhash Pawar, Prof. Moreshwar Meeshi	26-30
6	A Study of Job Satisfaction of Employees Working in Chartered Accountants Firm with Special Reference to Latur City Miss. Bagwan Samreen Nizam, Dr. Pushpalata Santosh Trimukhe (Kawale)	31-37
7	A Study of Standard of Living in Maharashtra Bokare Kamaji Purbhaji	38-42
8	A Level of Depression among Employed and Unemployed Youth Dr. Ganesh P. Vaykos	43-46
9	Poverty Trends in India Prof. Kamallesh Atmaram Raut	47-51
10	The Images of Male Characters in the Booker Prize Winning Indian Male Novelists Mohd. Salahuddin	52-55
11	Science of exercise and physical Fitness Dr. Raju Dayaram Chawake	56-58
12	Jurisdiction Issues under Maritime Law-An Overview ALIYAR M E	59-67
13	Analytical Study of the Provisions of the Indian Constitution Regarding Indigenous Peoples (Scheduled Tribes) In India Dr. Umesh S. Aswar	68-71
14	Potential Impact of Nanotechnology Rohit Srivastava, Md. Rasheed Tanveer	72-75
15	A Study of Stress in Women Police Constables in Pune City and its Impact on Physical and Mental Health Dr. Subhash Pawar, Prof. Moreshwar Meeshi	76-80
16	Human Migration: A Case Study of Shahuwadi Taluka Dr. Bhoge Digamber Bhagwat	81-84
17	Overview of Ethical, Social and Human Resource issues in Mergers and Acquisitions Bhawna	85-89
18	Assessment of Physico-chemical Parameters of Water – A Review Nandkishor J. Suryawanshi	90-92
19	A Study on Human Resource Management Practices in Pediatric Occupational Therapy Clinics S.M.Surya, Dr.B.Tamilmani, Dr.M.Mahendran	93-95
20	A Study of Digital Marketing Techniques for Increasing Monetary Income Ms.Varsharani Shivaji Ghadage	96-98
21	Digital Literacy and Rural Development Pradeep Appasaheb Patil	99-101
22	China's BRI Narrative and Afghanistan: Opportunities and Prospects Garima Lal	102-104
23	Contemporary Issues & Challenges in the Indian Education System Mr. Naresh W. Patil	105-108
24	Making of Indian English Poetry: A Discussion in the light of 19th century Indian English Poets Dr Narayan Surjit Behera	109-111
25	Women's Empowerment and Sustainable Development: In-Depth Analysis Ms. Meghavee G. Meshram	112-116

Assessment of Physico-chemical Parameters of Water – A Review

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Abstract: Man utilizes water in many of activities in his daily life. These activities include drinking, cooking, bathing, washing. Other than these activities, water is used for agriculture as well as industrial purpose. Without water life is impossible. So it is important to have good quality water for our daily activities. Water quality can be expressed on the basis of its physico-chemical as well as biological parameters. Poor quality water therefore is not suitable for the domestic, industrial and agricultural use. This paper presents a review on certain water quality parameters and the techniques used in assessment of water quality.

Introduction:

Water is the most essential need of human as well as living organisms on the earth. The quality of water either for drinking or domestic use has a significant impact on our health. Increased human population and industrialization have led to increased water pollution with harmful contaminants [1]. Water is polluted by manmade activities as well as natural activities like weathering of rocks and leaching of soils, mining processing etc. The sources of water are ground water, surface water (water from streams, rivers and ponds), atmospheric water (water from rain and glaciers). It is important therefore to check the water quality regularly as it may lead to various disease outbreaks like cholera, typhoid, dysentery, diarrhea etc. [2]. It is important to know the different physico-chemical parameters for water quality check. The water quality can be checked by testing its physical and chemical characteristics such as color, temperature, acidity, hardness, pH, sulphate, chloride, DO, BOD, COD, alkalinity etc. In this present paper, work carried out in past related to some of water quality assessing parameters have been discussed.

Physico- Chemical Parameters:

It is indispensable to check the water quality before it is being used for drinking, domestic, agricultural and industrial purposes. The choice of parameters to be tested depends on the purpose to use that water. Physical parameters like temperature, color, odor, pH, turbidity, TDS etc can be checked by its physical appearance while chemical parameters can be checked by for DO, BOD, COD, alkalinity, hardness etc.

Temperature:

Temperature has a great impact on aquatic life. Drastic change in temperature can be dangerous to aquatic life.

Color:

Color is an important parameter of water whether it is used for domestic or industrial use. Colorless water is preferred for use.

pH:

pH is an indicator of suitability of water for various uses like drinking, bathing, washing, cooking and agricultural use. pH also indicates the corrosive nature of water. pH is associated with alkalinity and electrical conductance[3]. The pH level of water as specified by the BIS is within the limit is 6.5 to 8.5. The increased pH values show more affected carbon dioxide, carbonate-bicarbonate equilibrium due to change in physico-chemical condition [4].

Electrical Conductivity:

Electrical conductivity of water shows the presence of ions within the water. It can also be correlated to pH value, alkalinity, calcium, total hardness, total solids, total dissolved solids, chemical oxygen demand of water. It is measured by electric conductivity meter. EC values are the indicators of industrial discharges. The desirable limit of conductivity as mentioned by BIS and ICMR is 600 mS/cm.

Turbidity:

The presence of turbidity in water may be due to the organic and inorganic constituents. Organic constituents may be responsible for waterborne diseases. However, inorganic constituents have not shown notable health effects. Turbidity can be measured with the help of a nephelometer instrument. The desired limit of turbidity is 5 NTU.

Total Dissolved Solids (TDS):

Total dissolved solids (TDS) are the indicators of amount of inorganic salts of calcium, magnesium, sodium etc. and small quantity of organic matter present in the water. According to BIS and ICMR, the permissible limit of TDS is 500 mg/l. High TDS values affect the taste of water.

Dissolved Oxygen (DO):

Dissolved oxygen (DO) is an important parameter and has correlation with aquatic life [5]. DO value less than 2 mg/l directly affects the sensitive aquatic life. DO values are also associated with industrial, human and thermal activity.

Chemical Oxygen Demand (COD):

Chemical oxygen demand (COD) is the quantity of dissolved oxygen required to cause chemical oxidation of organic material present in water thus it is the measure of organic compounds in water. COD is expressed in mg/l. Thus it is useful in indicating the organic pollution in surface water [6].

Biological Oxygen Demand (COD):

Biological oxygen demand (COD) is the measure of contamination of organic material in water and also the measure of oxygen in the water required by the aerobic organisms. BOD is specified in mg/l. Higher values of BOD are indicators of poor water quality. The biodegradation of organic materials causes oxygen tension in the water and increases the biochemical oxygen demand [7].

Alkalinity:

Alkalinity of water is caused by carbonate and bicarbonate ions present in it. pH of water is stabilized by alkalinity. The desirable limit of alkalinity present in water is 200 mg/l while its permissible limit is 600 mg/l. It is measured by titrating the water sample with standardized acid in presence of phenolphthalein and methyl orange indicators. Higher levels of alkalinity cause eye irritation in human as well as boiler problems in industries.

Hardness:

Hardness of water is due to metal cations of calcium and magnesium cations etc and certain anions present in it. Hardness is an important parameter in considering whether the water

would be suitable for domestic as well as industrial use. The desirable limit of hardness is 300 mg/l. Higher values of hardness may be found due to natural accumulation of salts, surface runoff or anthropogenic activities. Increased concentration of salts may also be due to excessive evaporation of water.

Chlorides:

Chlorides naturally occur in almost all types of waters. It is an indicator of pollution due to organic wastes caused by animal and industrial origin. The permissible limit of chloride in drinking water as per BIS and ICMR is 250 mg/l. Chlorides in water can be measured by titrating a known volume of water sample with a standard silver nitrate solution using potassium dichromate solution in water as an indicator.

Calcium (Ca):

Calcium is observed almost in all types of natural water in high quantities. The reasons for presence of calcium are rock leaching, disposal of sewage and industrial wastes. Calcium in water is measured by titrating with a standard solution of EDTA using Patton's and Reeder's indicator.

Magnesium (Mg):

Magnesium also occurs in all kinds of natural waters but its concentration is generally lower than calcium. The main source of magnesium is rocks. Industrial wastes and sewage are also the important sources of magnesium. Magnesium is also measured by titration with a standard solution of EDTA using Eriochrome black T as an indicator.

Sulphate:

Sulphate naturally occurs in drinking water. Sulphate content in water decides its suitability for domestic and industrial use. Sulphate is measured by nephelometric method. Its value is expressed in mg/l. Higher value of sulphate gives a bitter taste to water.

Different physico-chemical parameters with their guideline values as per BIS specification

Sr.No.	Parameter	BIS Specification
1	Temperature	23°C
2	pH	6.5 - 8.5
3	Conductivity	600 mS/cm
4	Turbidity	5 NTU
5	Total Dissolved Solids (TDS)	500 mg/l
6	Dissolved oxygen (DO)	-
7	Chemical Oxygen Demand (COD)	-
8	Biological Oxygen Demand (COD)	30 mg/l
9	Alkalinity	200 mg/l
10	Hardness	300 mg/l
11	Chlorides	250 mg/l
12	Calcium	75 mg/l
13	Magnesium	30 mg/l
14	Sulphate	150 mg/l

Concluding Remark:

1. Various methods of water quality assessment give a clue to develop appropriate management and strategies to municipal authorities.
2. Natural and anthropogenic activities are the sources of water pollution. Pollution levels

can be minimized by restricting the anthropogenic activities causing water pollution.

3. Water quality depends on the nature of pollutants added in the water.
4. It is necessary to examine the water quality before being used.

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