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# ANALYSIS OF VARIOUS GROUNDWATER QUALITY FACTORS IN KARIMNAGAR CITY FROM DIFFERENT LOCATIONS

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**Abstract**
Water is the most important natural resource for sustainable lifestyles and the environment. But ultimately, groundwater has long been contaminated by human and industrial activities. The water quality indicator is very important to protect and preserve water bodies. In this assessment of groundwater quality is carried out at unusual cadastral sites of Karimnagar city. Groundwater samples are collected from all selected sites for physicochemical analysis. We analyze the water quality index by water, following nine criteria; They are pH, Conductivity, TDS, Alkalinity, Turbidity, BOD, Chloride, Iron and Chlorine Demand. The results obtained are then compared with the Indian Standard Specifications for Drinking Water IS: 10500-2012. It was observed that all the parameters almost coincided with the desired limit. The study of the physical, chemical and biological characteristics of this groundwater sample indicates that an evaluation of water quality parameters, as well as water quality management practices, must be periodically carried out to protect water resources.

**Keywords**: Ground water, Water quality standard, physio-chemical, Water Quality Index.

## Introduction
Healthy and protected water is a vital need for humans. Our healthy lifestyle depends largely on water quality, whether for domestic or agricultural use. Nowadays, all water bodies are openly exposed to the source of pollution by which the water is polluted.
Water is the main natural resource necessary for the existence of life and is a simple human entity. Water resources are used for various purposes, such as drinking, agricultural, industrial, domestic, recreational and environmental activities, for example, according to Fort Gupta n, (2010). We refer to a series of technical research articles on groundwater quality assessment of wells drilled in different cities and countries, which are presented in the first phase of the thesis. A summary of reported work on groundwater quality index assessment is presented below.
Tyagi S, et al. (2013) conducted a water quality assessment in terms of water quality index in Uttarakhand (India). The study indicates that the Water Quality Index (WQI) is a valuable and unique classification to represent the usual condition of water quality in a single term and is useful for selecting the appropriate treatment technology to solve the concerned problems. However, ICA represents the combined effect of different water quality standards and communicates water quality information to the public and legislative specifiers. Although there is no universally accepted composite water quality index, some countries have used and are using aggregated water quality data in developing water quality indicators. Attempts have been made to review the ICA standards to determine the suitability of drinking water sources. Moreover, this article also highlights and draws attention towards the development of a new and globally accepted "Water Quality Index" in a simplified form, which can be generally used and can represent a reliable picture of water quality. Initially, ICA selected the ten most widely used water quality variables, such as dissolved oxygen (DO), pH, coliform bacteria, specific conductivity, alkalinity and chloride, etc., and they have been widely applied and accepted in European, African and Asian countries.

Kumar.M and Kumar.R (2013) conducted experimental work on physical and chemical properties of groundwater in UP, (India). The study deals with the assessment of existing granite mines in Jhansi (Goramachia) for the state of physical and chemical contamination of groundwater. Six different sites were selected to test samples collected from mines and urban areas. Three samples were taken at different distances from the place. This location is 10 km from Jhansi city. Physico-chemical parameters such as PH, D.O., EC, T.D.S., alkalinity, turbidity, hardness of calcium (calcium) and magnesium (magnesium), total hardness, NO3 (nitrate), F (fluoride), Fe+3 (iron) and Cl- (chloride). It was found that the parameters are not within the limit compared to those specified by the World Health Organization. Standards.
Shivacharanappa et al (2011) conducted research work in Bidar city (Karnataka) for groundwater characteristics and water quality index (W.Q.I.). This research work deals with the re-evaluation of W.Q.I. - Groundwater of the Bidar residential and industrial area. There are 35 areas in the city, from which samples are collected and 17 parameters are analysed. The parameters are pH, Total Hardness, Ca (Calcium), Mg (Magnesium), Chloride (Cl), NO3 (Nitrate), SO4 (Sulphate), T.D.S., Fe+3 (Iron), F (Fluoride), Sodium (Na), Potassium (K), Alkalinity, Manganese (Mn), D.O., Total Solids and Zinc (Zn). The results were used to defend water quality analysis models.
Siraj Al-Din. J, et al (2013) did work on groundwater to evaluate the W.Q.I. The samples were collected from Ambikapuram area near Tiruchirappalli area of Oyakondan canal. In order to develop the water quality index, the following parameters are examined: PH, EC, TDS, total hardness, D.O., COD, BOD, Cl-, NO3, and Mg. The air quality index for these samples ranged between 244 and 383.8. The analysis reveals that groundwater in the region needs a certain degree of treatment before consumption, and must be protected from the risks of pollution.
Cristina.R et al (2012), work on groundwater quality was carried out by W.Q.I. The road in the village of Turinj, Cluj Province. Today, Romanian rural residents still face no access to a safe source of drinking water. Therefore, in 2002 only 65% of the population.

**Materials and Methods**

The most significant contributor to recent breakthroughs in technical development is machine learning. In light of current advancements in the process control business, it is prudent to consider the expectations of both the client and the server when making crop recommendations through the Internet, trustworthy magazine articles, and machine learning algorithms of choice. It is broken down using the many resources that are readily accessible, such as the conferences that support the system. Web journals that may be accessed online provide useful information and, in most cases, offer advice and remedies in the event of a problem. It is necessary to be able to foresee such issues and deceptions, which may lead to catastrophic repercussions if they are not overcome. Technologies that use artificial intelligence (AI) have been able to forecast the behavior of nonlinear systems and have contributed to managing variables in order to enhance the operational conditions of the system. A new study highlighted the rise of artificial intelligence as a potential aspect of the answers for increased agricultural production.
Sharma et al. [21] proposed that solar-powered Internet of Things sensor nodes should be used to monitor and run agricultural areas. In the field of agriculture, operations like as crop management, crop harvesting, control of water supply, control of animals, distribution of pesticide, and temperature monitoring technologies will also be monitored and managed.
According to Suchithra [22], sensors have the potential to analyze environmental factors in a field, including temperature, humidity, and even the fertility of the soil. A verification is performed on the sensing value before it is sent to the Wi-Fi network. Once the data from the Wi-Fi module has been validated, it is sent to the farmer's mobile device or laptop computer through the cloud. In the event that the field needs attention, the farmers are also notified by SMS. An method that can be customized and used to govern the amount of water present in an MCU node is developed. This algorithm includes

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temperature, humidity, and fertility criteria. Farmers may take control of the engine from almost any location in the globe.
Joshi [23] detailed the process of building wireless agricultural environmental sensor nodes in order to track weather patterns and determine the external factors that contribute most to good crop yields in a certain agricultural land. This study focuses on the existing literature on the design of wireless agricultural environmental sensor nodes to monitor climatic variables and deduce the external circumstances that are ideal for producing high crop yields in a particular agricultural area. Agriculture and food production is a sector that has lately outsourced its emphasis to WSN, which strives to boost its output as well as the agricultural yield benchmark by making use of these contemporary technologies that are more efficient and less expensive. In recent years, wireless sensor networks, sometimes known as WSNs, have garnered a significant amount of interest.
According to Sangeeta et al. [24,] the purpose of the machine learning approach is to forecast the best crop yield in a certain area through the analysis of several climatic parameters, such as precipitation, temperature, and dampness, as well as soil pH, soil type, and previous plant crop records. This is accomplished by using a combination of these factors.
Mekonnen [25] said that the current study is a complete assessment of the deployment of several machine learning algorithms in sensor data analytics inside the agroecosystem. This was stated in the context of the article. A case study on an integrated food, energy, and water (FEW) system based on Internet of Things (IoT)-driven smart farm prototypes is shown here.
Ghadge [26] recommended to farmers that they monitor the fertility of the soil based on the results of data extraction analysis. The approach, as a result, places an emphasis on monitoring the quality of the soil in order to ascertain the kind of crop that is suitable for cultivation on a certain type of soil and to optimize crop output by making use of the fertilizer that is advised.
According to Sujawat [27], the tremendous applications of artificial intelligence may be found in a wide variety of fields. The capacity of artificial intelligence to comprehend issues, determine appropriate explanations for those problems, and identify appropriate remedies for those problems positions it to be of significant assistance in the fight against agricultural diseases. The research provides a concise introduction to the use of artificial intelligence in agriculture, as well as its many agricultural techniques and the many different methods that are available to detect illness in plants.
Kshirsagar and Akojwar [28–30] provide an in-depth discussion on the application of artificial intelligence to a variety of problems involving classification and prediction. In addition, they explain the application of hybrid artificial intelligence to problems involving feature extraction, classification, and prediction, as well as modeling using a variety of algorithms and optimization strategies. Significant demonstrations in the fields of artificial intelligence, case-based reasoning, multiagent optimization, scheduling, data mining, web crawlers, understanding natural languages and interpreting them, and virtual visual reality.

**Study Area:**
This study was conducted at different locations of Karimnagar city namely MM Thota, Kaman, Sahith Nagar, Ram Nagar, Rama Krishna Colony. Water samples are collected and run through the above parameters. Karimnagar city is located at latitude and longitude 18*26'18.79"N and 79*7'43.8"E and at an altitude of 275 meters above sea level.

| Areal location | Latitudes | Longitudes |
|---|---|---|
| M.M thota | 18*21’18.5” N | 79*4’43.4” E |
| Kaman | 18*23’18” N | 79*3’43.1” E |
| Saheth Nagar | 18*22’18.4” N | 79*5’43.5” E |
| Ram Nagar | 18*24’18.2” N | 79*6’43.3” E |
| Rama Krishna Colony | 18*25;18.3” N | 79*2’43.6” E |

**Fig. (1)** map locations of karimnagar city (google map)


**Fig. (1)** map locations of karimnagar city (google map)

Due to increasing urbanization, surface water is getting over contaminated and more stringent treatments would be required to make surface water potable. Therefore, it is required to additional sources for fulfill the requirement of water. Because the ground water sources are safe and potable for drinking and other useful purposes of human being. Hence studies of physic-chemical characteristics of underground water to find out whether it is fit for drinking or some other beneficial uses.

**COMPARING WITH INDIAN STANDARD DRINKING WATER SPECIFICATION: IS: 10500-2012**

| S.NO | Parameter | Unit | Accept limit | Permi limit |
|---|---|---|---|---|
| 1 | PH | - | 6.5-8.5 | No relaxation |
| 2 | Total dissolved solids | Mg / lit | 500 | 2000 |
| 3 | Alkalinity | Mg / lit | 200 | 600 |
| 4 | Turbidity | NTU | 1 | 5 |
| 5 | Chloride | Mg / lit | 250 | 1000 |
| 6 | Iron | Mg / lit | 0.3 | No relaxation |

**Table (1).** Comparing with indian standard drinking water specification:is : 10500-2012

## III. REULTS AND DISCUSSION:

| Locations | Ph | Conductivity | T.d.s | Alkalinity | Turbidity | B.O.D | Chlorine | Iron | Chlorine demand |
|---|---|---|---|---|---|---|---|---|---|
| M.M thota | 7.3 | 720-880 us/cm | 540-660 mg/lit | 70 ppm | 20NTU | 1.5 mg/lit | 60 mg/lit | 0.2ppm | 0.4 mg/lit |
| Kaman | 7.0 | 738-902 us/cm | 653.5-676.5 mg/lit | 100 ppm | 15 NTU | 1.51 mg/lit | 80 mg/lit | 0.2ppm | 0.2 mg/lit |
| Saheth nagar | 7.5 | 783-957 us/cm | 587.25-717.7 | 120 ppm | 23 NTU | 2.12 mg/lit | 50 mg/lit | 0.3ppm | 0.3 mg/lit |

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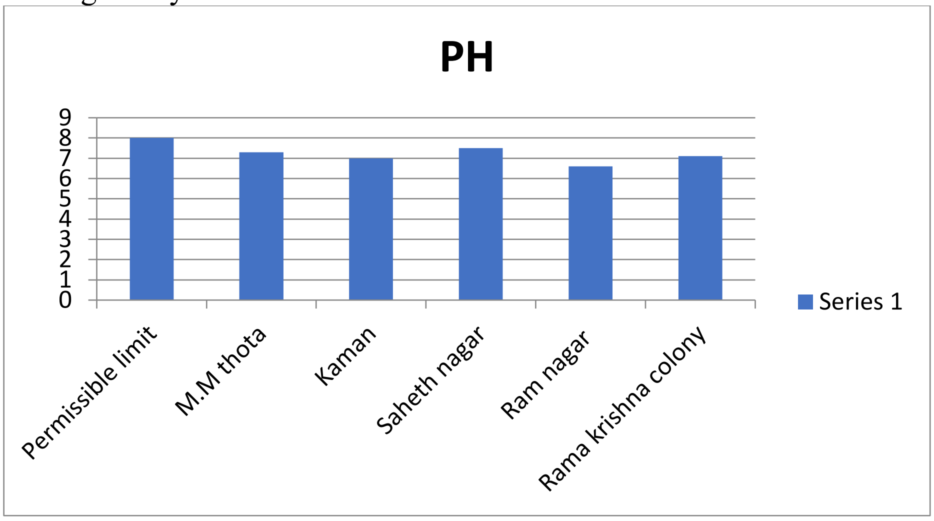
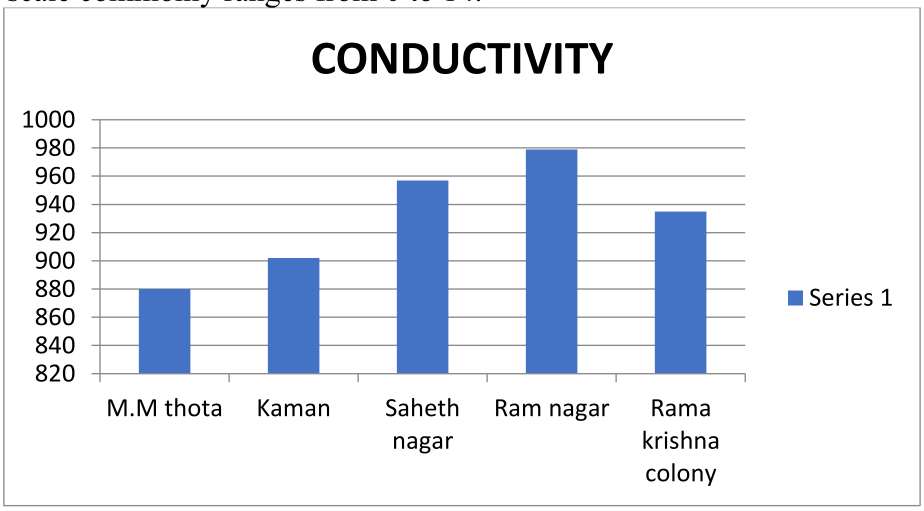
| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | 5 mg/lit | | | | | | |
| Ramnagar | 6.6 | 801-979 us/cm | 600.75-734.25 mg/lit | 80 ppm | 28 NTU | 3.33 mg/lit | 50 mg/lit | 0.3ppm | 0.4 mg/lit |
| Rama Krishna colony | 7.1 | 765-935 us/cm | 573.75-701.26 mg/lit | 50 ppm | 18 NTU | 1.8 mg/lit | 40 mg/lit | 0.3ppm | 0.3 mg/lit |

**Table (2).** water samples and analysis of physicochemical characteristics of water samples at different locations of karimnagar City.




PH of solution is taken as –ive logarithm of H2 ions for many practical practices. Value range of PH from 7 t0 14 is alkaline, from 0 to 7 is acidic and 7 is neutral. Mainly drinking water pH lies from 4.4 to 8.5. The PH scale commonly ranges from 0 to 14.




Conductivity is the capacity of water to carry an electrical current and varies both with number and types of ions the solution contains.

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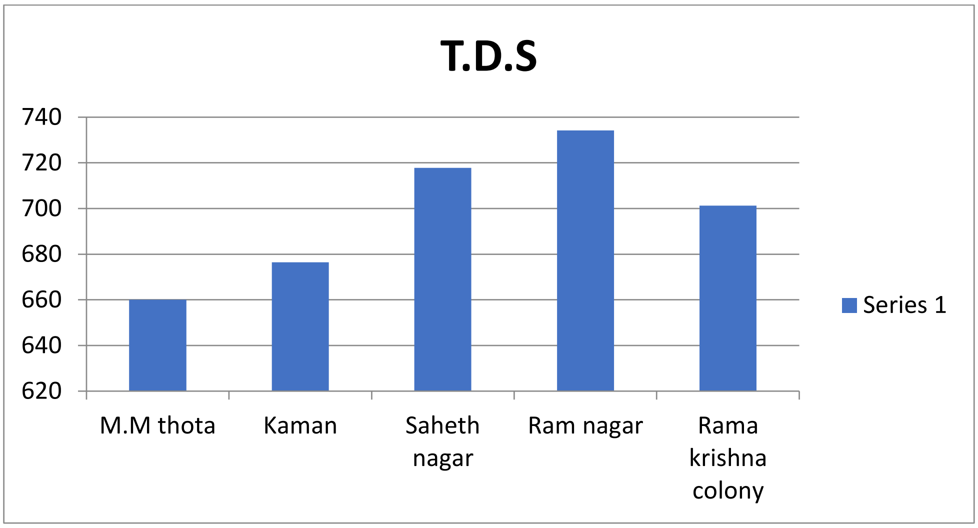
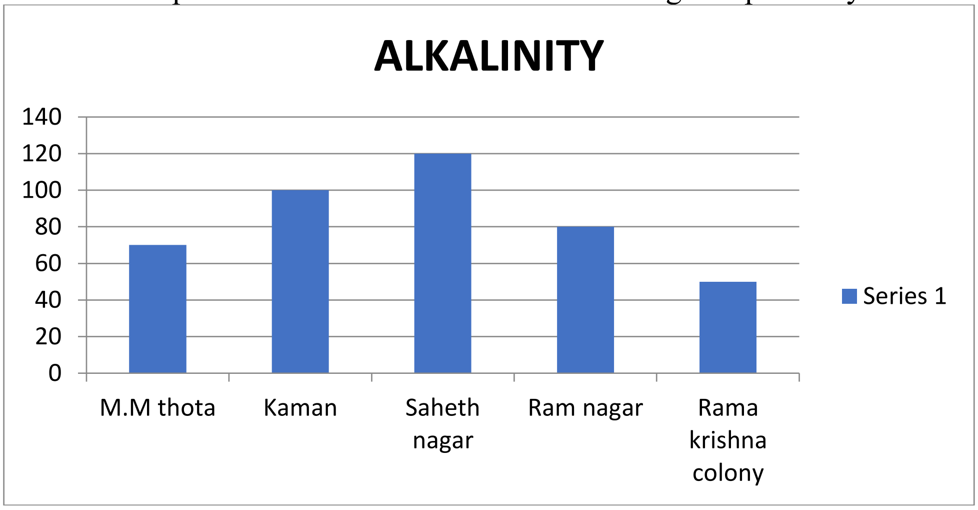
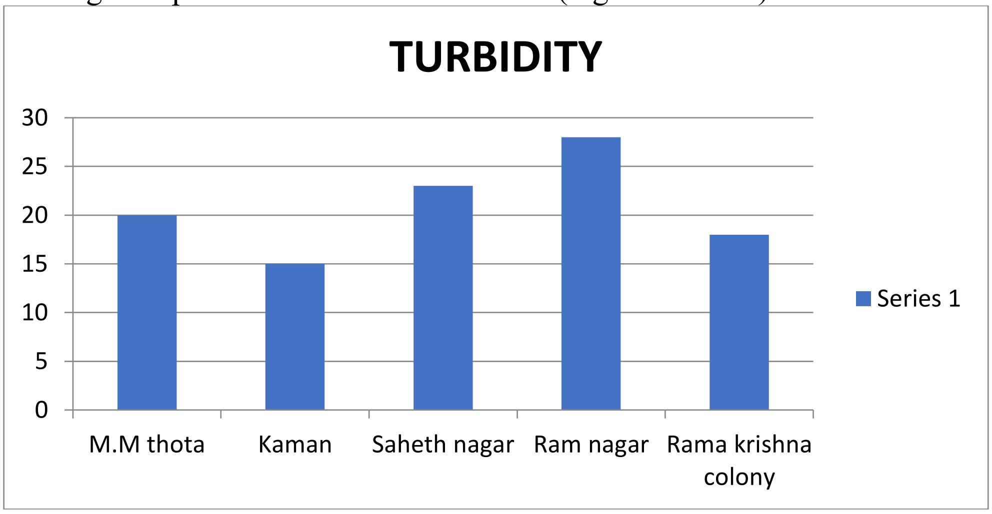



In water sample conductivity can also be estimated from conductivity measurement. The acceptable and permissible limits As per IS: 10500-2012 is 500 and 2000 mg/l respectively.




Alkalinity is the sum total of components in the water that tend to elevate the pH to the alkaline side of neutrality. It is measured by titration with standardized acid to a pH value of 4.5 and is expressed commonly as milligrams per liter as calcium carbonate (mg/l as $CaCo_3$).




Suspension of particles in water interfering with passage of light is called turbidity. Turbidity is caused by wide variety of Suspended particles.

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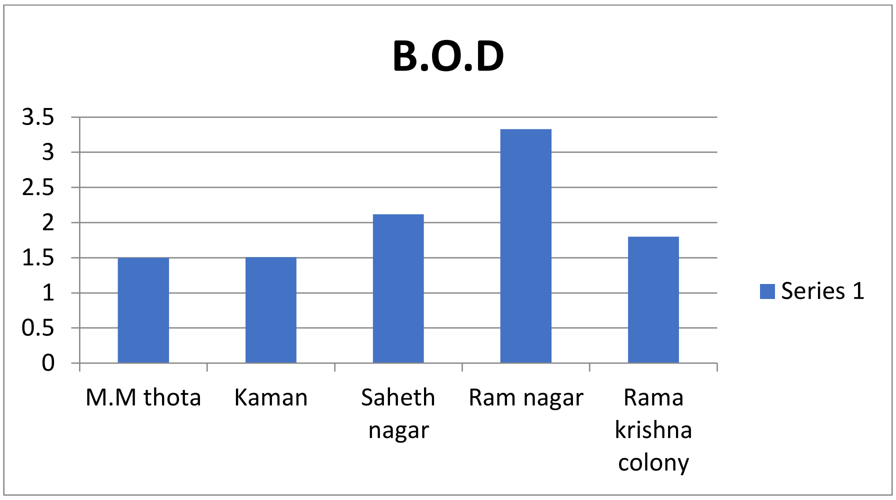
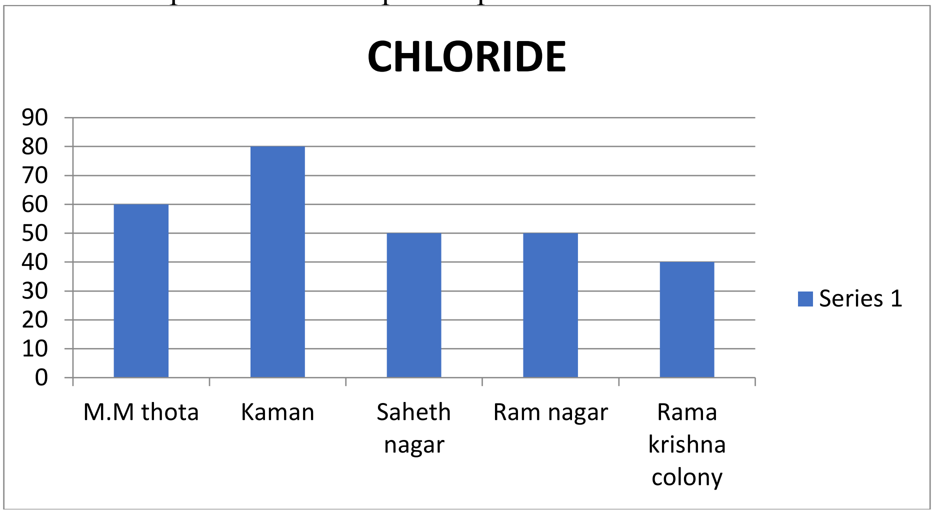
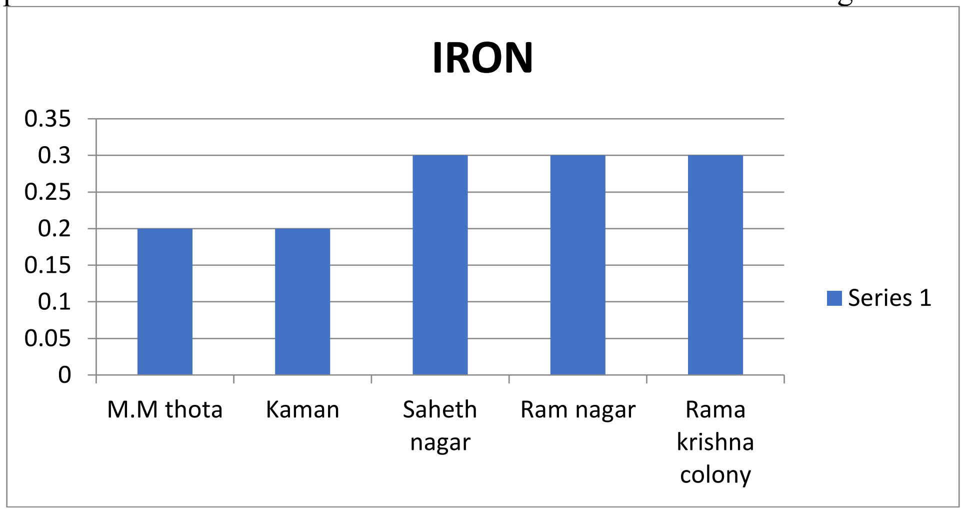


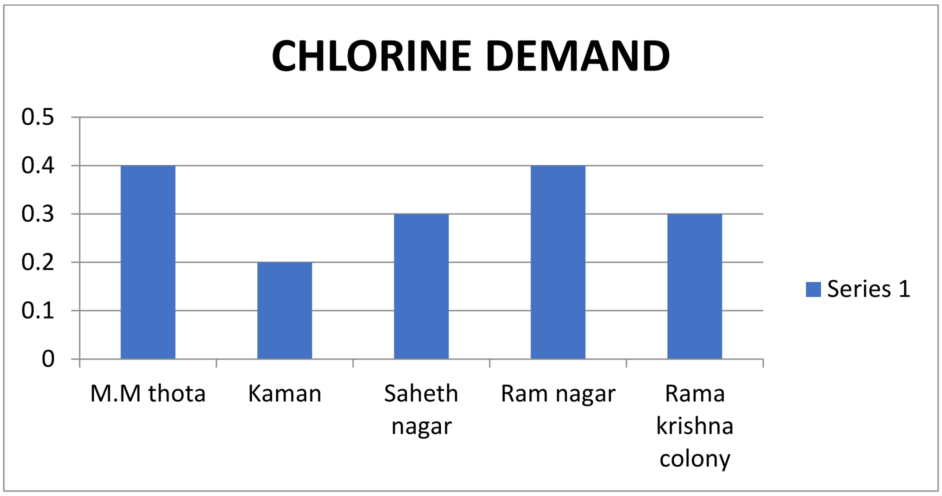

B.O.D is also called as Biological Oxygen Demand . It is the amount of dissolved oxygen needed ( i.e.., demanded ) by aerobic biological organisms to break down organic material present in a given water sample at certain temperature over a specific period of time .




All type of natural and raw water contains chlorides. It comes from activities carried out in agricultural area, Industrial activities and from chloride stones. Its concentration is high because of human activities. As per IS: 10500-2012 Desirable limit for chloride is 250 and 1000 mg/l in Permissible limit.




Every water contains iron in it but the accept limit is about 0.3 ppm and the peri limit is no-relaxation.




Chlorine demand is the difference between the amount of chlorine added to water or wastewater and the amount of residual chlorine remaining after a given contact time.

**IV. CONCLUSION:**

The water collected from all the selected sites is considered safe to use, by comparing the results with the Indian Standard Specifications for Drinking Water IS: 10500-2012, Table (1). So we can say that it is safe to use. Table (2) Water quality depends on the type of contaminant added and the nature of the mineral present in a specific area of the well. Groundwater quality is monitored by collecting representative water samples and analyzing the physical and chemical properties of water samples at different locations in Karimnagar city. Furthermore, all water samples selected from different sites were confirmed to be safe for use in domestic, agricultural, industrial and other activities.

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