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GROUND WATER QUALITY ANALYSIS OF AKOLA CITY

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Abstract: *The quality of ground water depends on various chemical constituents and their concentration, which are mostly derived from the geological data of the particular region. Industrial waste and the municipal solid waste have emerged as one of the leading cause of pollution of surface and ground water. In many parts of the country available water is rendered non-potable because of the presence of heavy metal in excess. The situation gets worsened during the summer season due to water scarcity and rain water discharge. Contamination of water resources available for household and drinking purposes with heavy elements, metal ions and harmful microorganisms is one of the serious major health problems. Paper mainly refers to the ground water quality of Akola city. The Akola city is divided in to four zones for water collection, Selection of location for collecting water sample, Collection of Water Sampling, and The Physical Tests and Chemical tests were carried out during water analysis. The analysis done with Drinking Water Quality Standards as per IS: 10500-2012.From the analysis various valuable findings like diversification in water quality, excess nitrite contains, and high TDS values as well as salinity are obtained which demands further corresponding treatment for domestic as well as industrial use*

Keywords: *Ground water, fluorides, hardness, nitrites, chlorides, Iron, etc.*

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INTRODUCTION

Water being one of the unavoidable prime resources, it is necessary to timely study the physical and chemical properties of water in the locality. Over all human, industrial and thus economical development is based on provision of available wants in the region. With the study in native place, it becomes possible to find out good and unwanted properties of water so that concern treatment can be given. The native place or locality considered being region of research and study is Akola City. Akola is the city in vidarbha region in the state of Maharashtra in central India. Akola is the administrative head quarters for Akola district located in Amravati Division. Today, Akola is developing city and has very good grain market, oil mills dal mills and known for production of cotton. As of 2011 India census data , Akola City had a population of 427,146 and an area of about 52 km^2 out of which 28 km^2 falls under municipal limits. Akola urban area including the neighboring suburbs of Khadki, Malkapur and Shivni. Akola city is divided into 73 electoral wards and 4 zones stretching up to an area of 28 $km^{2.}$ Average Annual Rainfall: 750 to 950 mm

METHODOLOGY

Akola city is divided in to four zones for water collection; Selection of location for collecting water sample, the process of sampling is cluster and batching way in which all ward regions of city are considered to be individual domain area. Collection of Water Sampling, and The Physical Tests and Chemical tests were carried out for water analysis.

The standard required parameters are considered to be values mentioned in Indian Standard: Water Quality Standards 10500-2012. Further deviation values are mentioned to be under or exceed level for creating base of future research work.

Table no: 1 – Regions under considration

Zone 1		
Sr. No.	Location	Sample No
1.	Sindhi Camp	1
2.	Tukaram Hospital	2
3.	Alsi Plots	3
4.	Regional Workshop	4
5.	Kaulkhed 35-B	5
Zone 2		
Sr. No.	Location	Sample No
1.	Bara Jotirling Mandir	6
2.	Ramdaspeth	7
3.	Jawaharnagar	8
4.	Dwarka Nagri	9
5.	Gmd Market Area	10
Zone3		
Sr. No	Location	Sample No
1	Rajeswar Temple	11
2	Kala Maruti	12
3	Old City	13
4	Dabki Road	14
5	Vitthal Mandir	15
Zone 4		
Sr. No	Location	Sample No
1	Railway Station	16
2	Gaulipura	17
3	Malipura	18
4	Umri	19
5	Deshmukh Fail	20

Fig. no. 1:- Map of Akola city highlighting various wards under study.

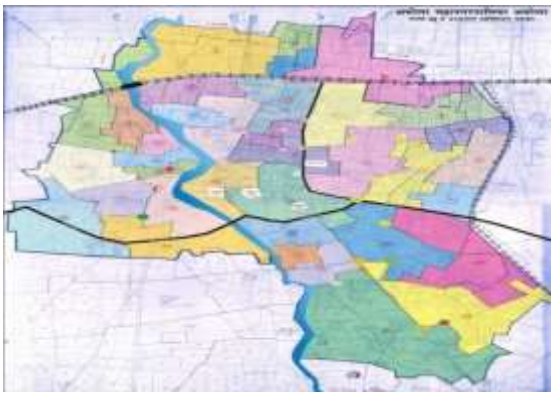

Table no. 2 - Drinking Water Quality Standards IS: 10500-2012

SR.NO	Characteristic	Requirement	Permissible limit
1.	Colour Hazen units, Max	5	15
2.	Odour	Agreeable	Agreeable
3.	P H value	6.5-8.5	No relaxation
4.	Taste	Agreeable	Agreeable
5.	Turbidity NTU, Max	1	5
6.	Total dissolve solid mg/l	500	2000
7.	Chloride mg/l, Max	250	1000
8.	Fluoride mg/l, max	1.0	1.5
9.	Iron (Fe) mg/l , max	0.3	No relaxation
10.	Total alkalinity mg/l, max	200	600
11.	Total hardness mg/l, max	200	600
12	Nitrites as (NO_3) mg./lit.	45	No relaxation

Table no. 3 – Observations Of Various Parameters Of Different Wards

OSERVATION TABLE		Various Sampling Location				
SR	Sampling No.	1	2	3	4	5
	Date of Collection & Testing	15/01/16	21/01/16	21/01/16	21/01/16	21/01/16
	Physical parameters					
1	Temp at site (^{0}C)	22	23	23	22	22
2	Temp at lab (^{0}C)	22	23	23	22	22
3	Color	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
4	Taste & Odour	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
5	Turbidity (NTU)	0.05	0.1	0.1	0.1	0.05
	Chemical parameters					
6	Ph	6.97	6.80	7.45	6.87	7.5
7	Alkalinity	364	390	418	300	425
8	Total dissolved solids (mg/l)	790	569	500	689	120
9	Total hardness (mg/l)	440	530	450	530	200
10	Chloride content (mg/l)	65	80	100	84.98	226
11	Nitrites as (NO_3)	35.5	30.5	30.5	25.5	20.1
12	Iron (Fe)	0.051	0.02	0.13	0.20	0.08
13	Fluoride (as F)	0.24	0.51	0.20	0.50	0.24

SR	Sampling No.	6	7	8	9	10
	Date of Collection & Testing	21/01/16	21/01/16	21/01/16	21/01/16	21/01/16
	Physical parameters					
1	Temp at site (^{0}C)	23	23	24	23	24
2	Temp at lab (^{0}C)	23	23	24	23	24
3	Color	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
4	Taste & Odour	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
5	Turbidity (NTU)	0.1	0.05	0.07	0.1	0.1
	Chemical parameters					
6	Ph	6.90	6.90	7.35	7.75	7.57

7	Alkalinity	390	388	433	455	445
8	Total dissolved solids (mg/l)	695	1449	422	300	773
9	Total hardness (mg/l)	470	840	410	840	410
10	Chloride content (mg/l)	115	170	80	170	80
11	Nitrites as (NO_3)	25.5	40.5	38.5	52.45	40
12	Iron (Fe)	0.13	0.15	0.1	0.26	0.19
13	Fluoride (as F)	0.84	0.20	0.84	0.62	0.80
SR	Sampling No.	11	12	13	14	15
	Date of Collection & Testing	01/02/16	01/02/16	01/02/16	01/02/16	01/02/16
	Physical parameters					
1	Temp at site (^0C)	23	25	25	24	26
2	Temp at lab (^0C)	23	25	25	24	26
3	Color	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
4	Taste & Odour	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
5	Turbidity (NTU)	0.12	0.5	0.8	0.13	0.1
	Chemical parameters					
6	Ph	7.8	7.4	7.6	7.8	7.8
7	Alkalinity	460	414	418	450	456
8	Total dissolved solids (mg/l)	728	754	747	352	444
9	Total hardness (mg/l)	300	260	180	264	300
10	Chloride content (mg/l)	130	85	130	90	120
11	Nitrites as (NO_3)	38.5	30.5	30.5	31.5	30.5
12	Iron (Fe)	0.045	0.162	0.152	0.043	0.192
13	Fluoride (as F)	0.40	0.40	0.39	0.40	0.50
SR	Sampling No.	16	17	18	19	20
	Date of Collection & Testing	04/02/16	04/02/16	04/02/16	04/02/16	04/02/16
	Physical parameters					
1	Temp at site (^0C)	24	29	28	29	26
2	Temp at lab (^0C)	24	29	28	29	26
3	Color	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
4	Taste & Odour	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable

5	Turbidity (NTU)	0.7	0.7	0.15	0.1	0.13
	Chemical parameters					
6	Ph	7.47	7	7.48	6.8	6.85
7	Alkalinity	420	390	419	382	393
8	Total dissolved solids (mg/l)	270	414	280	575	525
9	Total hardness (mg/l)	344	498	304	532	420
10	Chloride content (mg/l)	75	100	80	130	110
11	Nitrites as (NO_3)	25.8	29.75	25.5	28.5	21.5
12	Iron (Fe)	0.230	0.068	0.15	0.123	0.152
13	Fluoride (as F)	0.23	0.46	0.82	0.63	0.34

GRAPHICAL REPRESENTATION OF VARIOUS TESTS

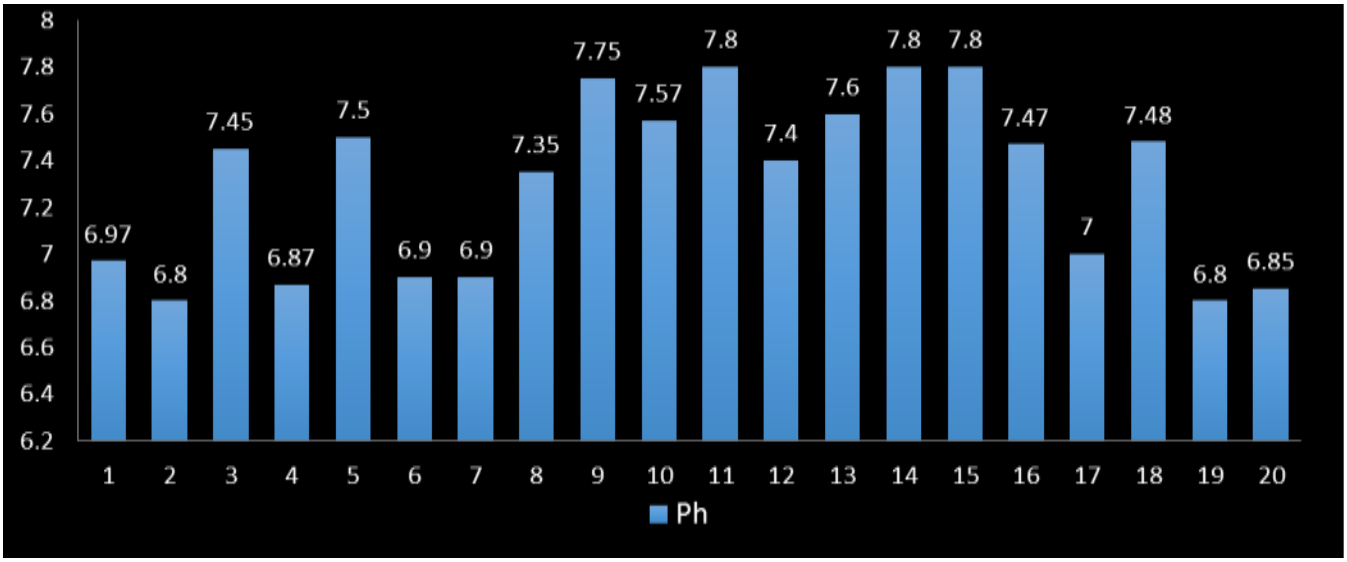

Fig. no. 2:- Sample Wise Ph values.

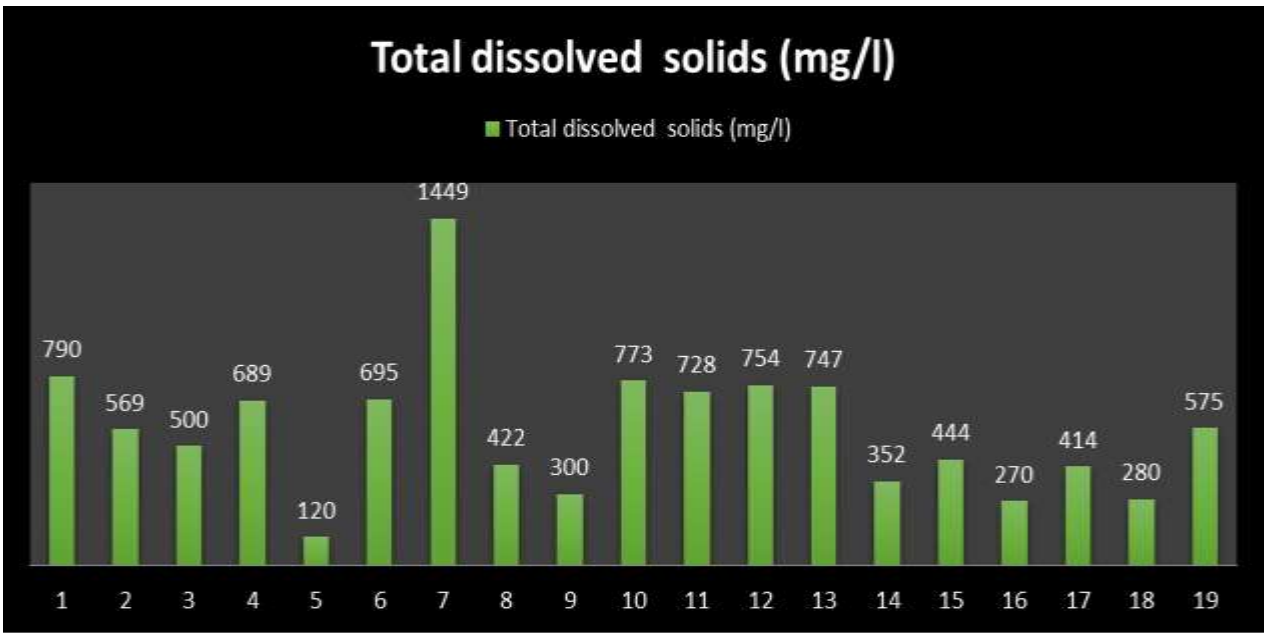

Fig. no. 3:- Sample Wise TDS values.

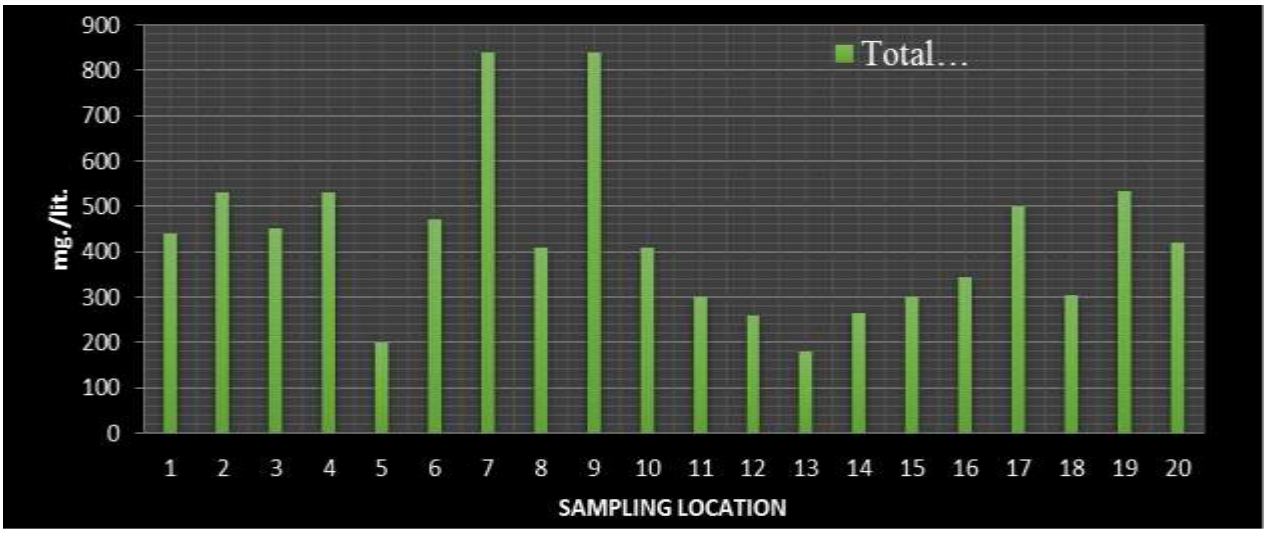

Fig. no. 4:- Sample Wise Total Hardness values.

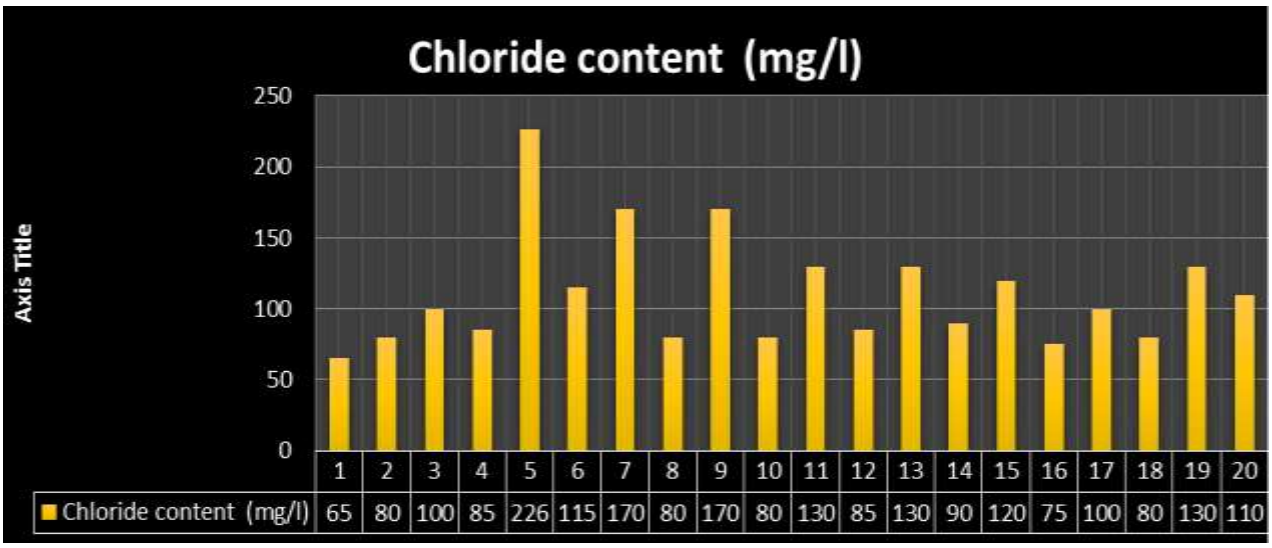

Fig. no. 5:- Sample Wise Chloride content.

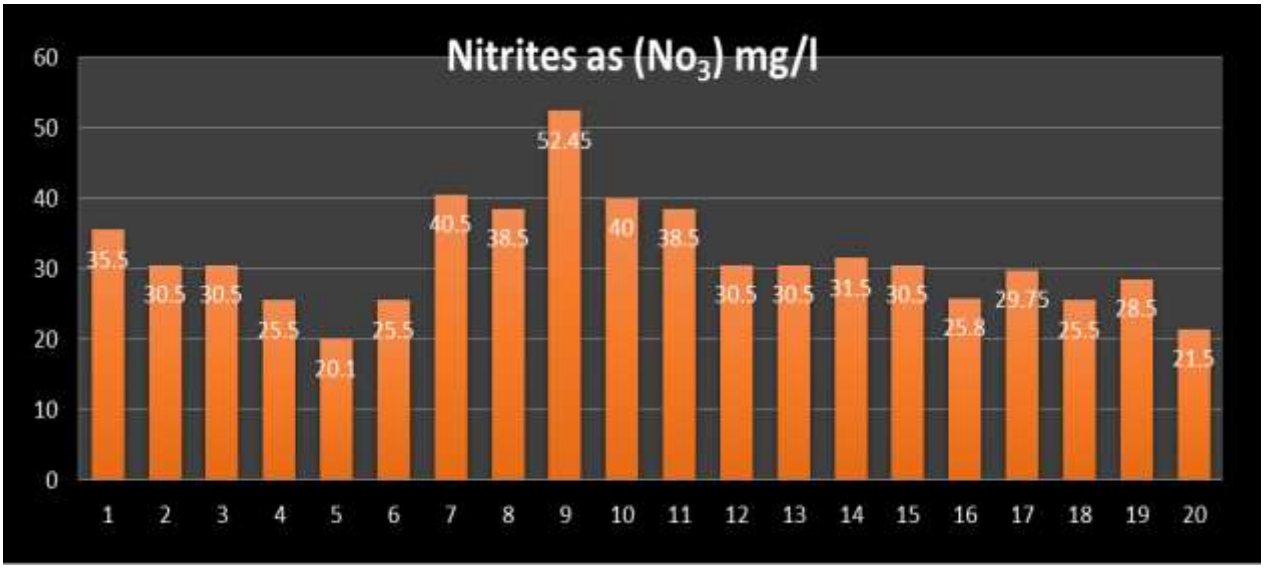

Fig. no. 6:- Sample Wise Nitrites as No_3.

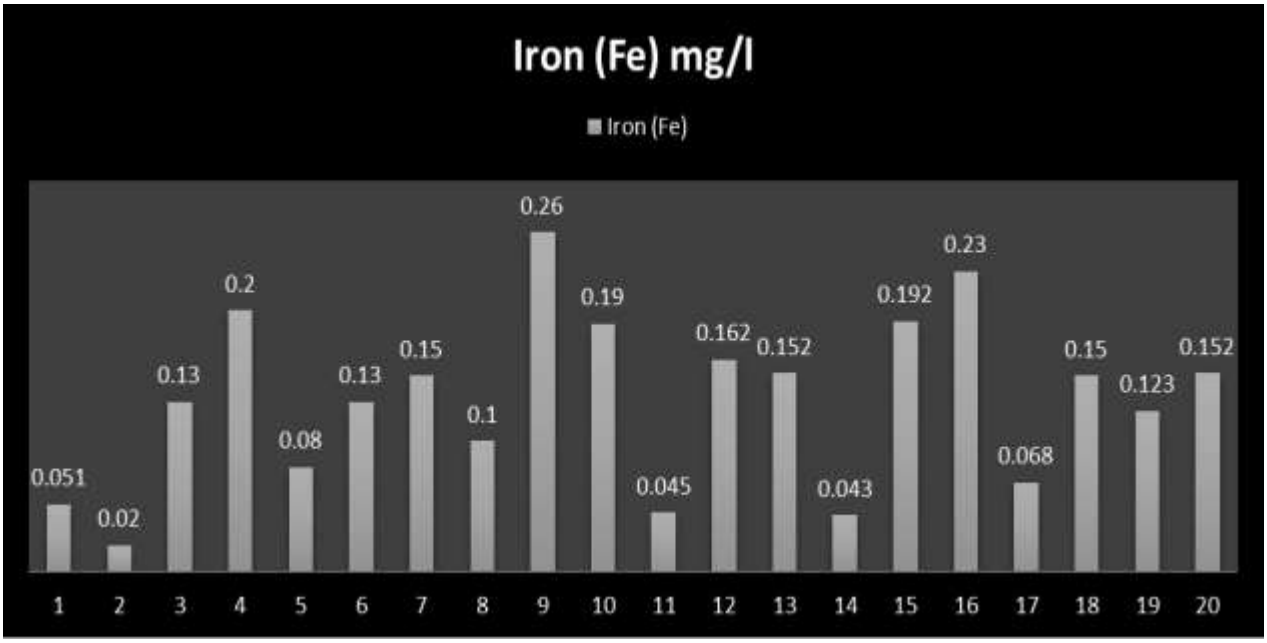

Fig. no. 7:- Sample Wise Iron content.

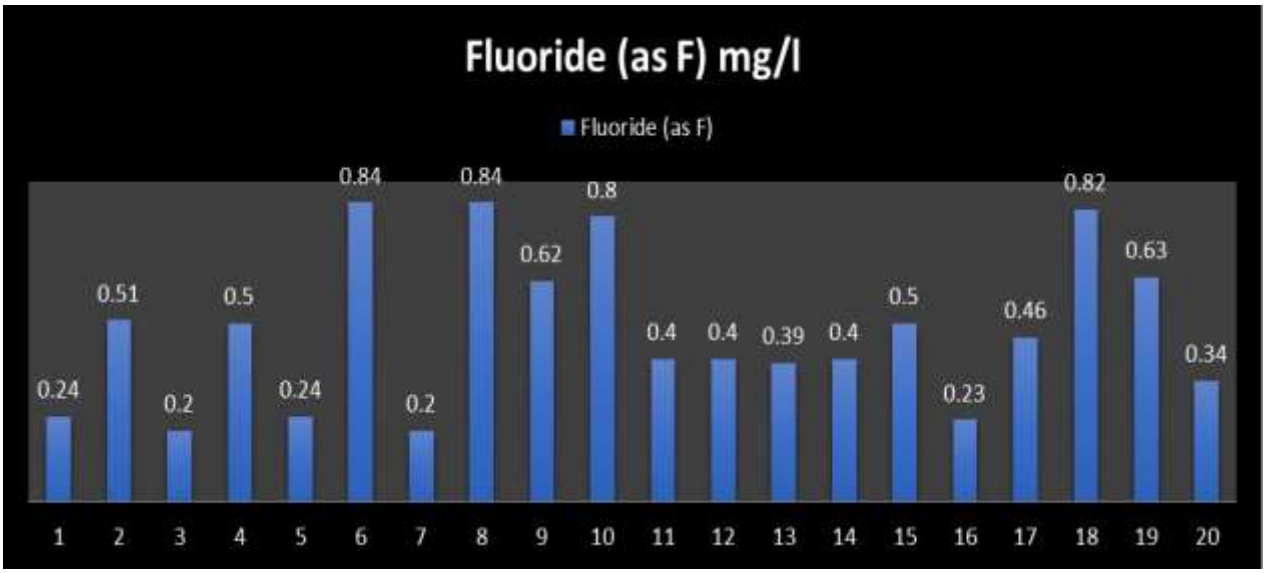

Fig. no. 8:- Sample Wise Fluoride content.

RESULT AND DISCUSSIONS

The examination of water samples is studied in the environmental engineering laboratory at College Of Engineering and Technology, Akola. From the water analysis the values of ph at

different zones are between 6.8 to 7.8, which are satisfying the Water quality standards I.S. 10500-2012.

The Total Dissolved Solids at different zones are between 120 mg. /lit. and 1449 mg./lit. which are satisfying the range of I.S. 10500-2012 .The Hardness of water is found 840 mg. /lit. at sampling location no. 07 and no. 09. The desired values and permissible values as per Water quality standards I.S. 10500-2012 are 200mg./lit. and 600 mg./lit. respectively, thus the treatment should be given to the water before using it for drinking purpose. The Chloride content at different zones is between 65 mg. /lit. and 226 mg./lit., and are satisfying the I.S. 10500-2012 .The value of Nitrite at sampling location no.09 is 52.45 mg./lit which is not within the desired limits and it is also mentioned by the District Public Health laboratory Akola, the value must be between 0 to 45 mg./lit. . There is no relaxation for Nitrites value in IS 10500-2012.

The fluoride is between 0.2 to 0.84 which is below than the desirable value mentioned in water quality I.S. 10500-2012. The value should be between 1.0 mg/lit. to 1.5 mg./lit .The Iron (Fe) value found as 0.02 mg./lit. to 0.26, which satisfies the range of water quality standards

CONCLUSION

The threat of harmful contaminants in drinking water can no longer be reasonably ignored. The correlation between contaminated drinking water and many significant diseases and health problems is far too strong to discount. Of course, municipal water treatment facilities have lowered the presence of many of the more harmful contaminants, and the EPA has set maximum contaminant levels, below which it is assumed that contaminants may be safely ingested into the body.

Municipal treatments facilities are not infallible, and EPA levels do not represent a safety level for every person. Children, the elderly, and those individuals who already have weakened immune systems, are particularly at risk to drinking water contaminants. Two of the most volatile drinking water contaminants, chlorine and fluoride, are actually treatment additives.

There are many home treatment alternatives that can purify drinking water to a greater extent than city treatment plants. Reverse osmosis and distillation, two of these alternatives, are moderately successful at removing some contaminants, but they are expensive. Packaged drinking water, besides being expensive and highly unfeasible as a main drinking water source, is not under the same government regulations as municipal water systems and may actually contain more contaminants than tap water. The absolute best technology now available for treating water and removing undesirable contaminants is water filtration. Water filters, when compared to any other water treatment alternative, will remove more contaminants and

provide safer, healthier drinking water. And thus, the above study shows that it is unavoidable to carry of research work for finding water contents from time to time of the various localities so as to safeguard ecological and economical aspects.

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