STUDIES ON GROUND WATER CHEMISTRY IN VICINITY OF NADERGUL VILLAGE.RANGAREDDY DISTRICT

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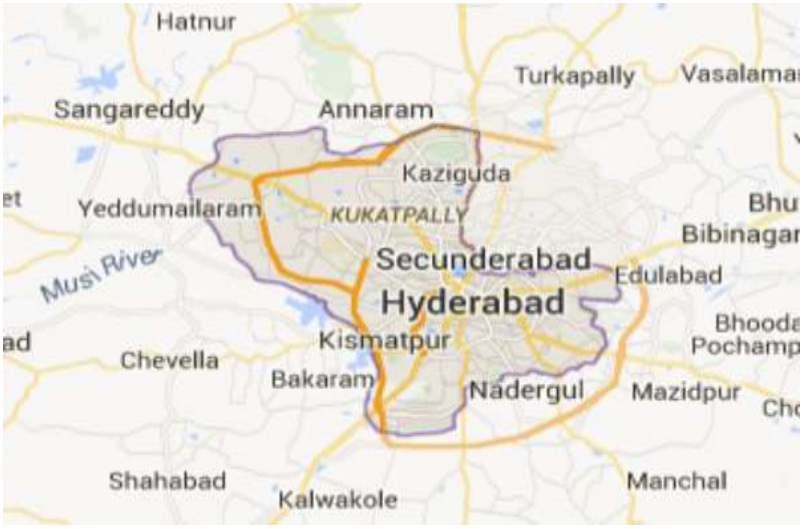
Abstract: Now a day the world attention is mainly focused on the depletion of the atmospheric ozone layer and environmental pollution by organizing world health day, earth day etc. A more serious problem of pollution of water resources is literally brewing under our feet Environmental pollution is the unfavorable alteration of our surroundings, wholly or largely as a byproduct of man's actions, through direct or indirect effects of changes in energy patterns, radiation levels, chemicals and physical constitution and abundances of organisms. In recent years a great deal of concern has been expressed over the problems of contamination to soil, sediments, groundwater and surface water with heavy metals due to rapid industrialization and urbanization. Nadergul village and its surrounding areas are the rapid developing areas in the telangana state, near to that multi notation organization are started which impact on the environmental pollution, quality of ground water. In urban areas the activities of man, including technological development, result in waste disposal leading to various types of pollutants such as trace elements, which often cause damage to the environmental systems, quality of ground water.

Key words: Water Samples, Anions, Cations, instrumental analysis.

Introduction:

Nadergul is located in south west of Saroornagar Mandal. This zone is not rapidly developed due various reasons. One reason may be central government organization such as DRDO, RCI, ARCI, DMRL etc. due to this at some patches irrigation practice is there from houses and much open land is available. But the recent trend that is in the period of 2010 on wards and new multi nation company are started. which made this area as new residential zone .

.Geologically Nadergul surrounding consists of granites, dolerites. Dolerites occurred as dyke rocks in some places, exposed dolerite dykes are there whose width ranges from feet to more than one km. height is also more as a result formed as pediplanes (Ridges) which act like water dividing line (water shade boundary). Dolerite dykes sometimes suffered, completely weathered, partially weathered which gave white color C^{a2+} predominant rocks converted as limestone. Fe rich rocks are red or reddish black soils were formed in and around study area. Mixed soils are their in this region the sample are collected in pre monsoon and post monsoon for a period of more then one 10 years and studied 12 parameter. to find out the impact of industrialization and urbanization of ground water quality.



Methods & Experimental Procedure:

2. Sample Collection: The sample is collected from selected location as season wise from post monsoon and pre monsoon. The sample collection points are some residency areas, agriculture area of Nadergul and surround areas. Test sample taken in Containers typically are made of plastic or glass, but one material may be preferred over the other. For example, silica, sodium, and boron may be leached from soft glass but not plastic, For samples containing organic compounds, do not use plastic containers except those made of fluorinated polymers.

Experimental Procedure

pH

pH can be measured in many methods such as electrometric method, pH-metry method using glass reference electrode. The method we used is pH-metry.

HARDNESS TEST

When total hardness is numerically greater than that of total alkalinity expressed as CaCO3, the amount of hardness is equivalent to less than total alkalinity, is called Carbonate hardness. When the hardness is numerically equal to total alkalinity, all hardness is Carbonate hardness. The amount of hardness in excess of total alkalinity expressed as CaCO3, is non-carbonate hardness, Non-Carbonate(Permanent) hardness is due to association of the hardness causing cations with sulphate, chloride or Nitrate. It cannot be removed by boiling. Hardness in water is determined using complex metric titrimetry. The titrant used is EDTA as complexing agent for Ca, Mg ions and EBT is used as indicator. The volume of EDTA consumed for the wine red color to change to blue is noted and hardness is calculated.

CHLORIDES:

Chloride ion is determined by Mohrs method titration with standard silver nitrate solution by which silver chloride is precipitate at first. The end of titration is indicated by formation of red-silver-chromate from excess AgNO3 and potassium chromate is used as an indicator in neutral to slightly alkaline solution.

POTTASIUM:

Trace amount of potassium is determined by direct reading of flame photometer at a specific wavelength of 766.5m by spraying the sample into the flame. The desired spectral lines are then isolated by the use of interface filters or suitable slit arrangements. The intensity of light is measured by the phototube.

Sodium :Trace amounts of sodium is determined by flame emission photometry at thewavelength of 589 nm.

UV spectrophotometer method for NO_3: NO_3^- is determined with ultraviolet absorption at 220nm

Determination of sulphate ions: ultraviolet absorption method used for sulphate ion determination.

Ion selective electrode method Fluoride (F^{-})Fluoride-sensitive electrode, Reference electrode (calomel electrode.) are used foe Fluoride determination

SAMPLE-1&2 Location: : Ashok Reddy Nager colony
pre monsoon Date: 03-04-08 Tested on: 04-04-08 post monsoon Date; 12-10-2008, Tested on: 14-10-08

Sl.no	Characteristics	Groundwater pre monsoon	Groundwater post monsoon
1	pH	6.98	7.19
2	Electrical Conductivity-/cm	964	1269
3	Total Dissolved Solids-mg/l	653	935
4	Total Hardness as caco3-mg/l	388	486
5	Calcium Hardness as caco3-mg/l	195	225
6	Magnesium Hardness as caco3-mg/l	213	229
7	Na+	83	119
8	K+	4	4
9	chloride	142	185
10	suiphate	114	114
11	Nitrate	10	12
12	Fluoride	0.66	1.25

SAMPLE-3&4 Location: Devathala Gutta
pre monsoon Date: 10 -04-09, Tested on: 12-04-2009 post monsoon Date; 09-10-2008, Tested on: 10-10-2009

Sl.no	Characteristics	Ground Groundwater pre monsoon	Groundwater post monsoon
1	pH	7	7.41
2	Electrical Conductivity	985	1158
3	Total Dissolved Solids	865	963
4	Total Hardness as caco3	412	488
5	Calcium Hardness as caco3-mg/l	146	196
6	Magnesium Hardness as caco3-mg/l	184	203
7	Na+	112	88
8	K+	4	5
9	chloride	154	190
10	suiphate	82	102
11	Nitrate	11	17
12	Fluoride	0.88	1.02

SAMPLE-5,6Location: Kurmal gudda
pre monsoon Date: : 4-4-2010 Tested on: 6-04-2010 post monsoon Date: 10-10-2010 Tested on: 12-10-2010

Sl.no	Characteristics	Ground water pre monsoon	Groundwater post monsoon
1	pH	6.69	7.19
2	Electrical Conductivity	1065	1263
3	Total Dissolved Solids	798	814
4	Total Hardness as caco3	422	463
5	Calcium Hardness as caco3-mg/l	163	196
6	Magnesium Hardness as caco3-mg/l	206	198
7	Na+	97	89
8	K+	4	6
9	chloride	190	194
10	suiphate	102	112
11	Nitrate	17	12
12	Fluoride	0.98	0.99

SAMPLE-7,8Location: Guram gudda
pre monsoon Date: : : 09-04-2011 Tested on: 10-04-2011 post monsoon Date: 09-11-2011 Tested on: 11-11-2011

Sl.no	Characteristics	Groundwater Pre monsoon	Ground water post monsoon
1	pH	6.89	7.14
2	Electrical Conductivity	978	1142
3	Total Dissolved Solids	691	966
4	Total Hardness as caco3	501	412
5	Calcium Hardness as caco3-mg/l	245	183
6	Magnesium Hardness as caco3-mg/l	233	201
7	Na+	98	221
8	K+	4	120
9	chloride	216	3
10	suiphate	78	298
11	Nitrate	8	14
12	Fluoride	1.62	1.12

SAMPLE-9,10Location : Adibatla village
pre monsoon Date: : : : 09-02-2012, Tested on: 10-02-2012,post monsoon: Date: 12-11-2012, Tested on: 14-11-2012

Sl.no	Characteristics	Groundwater premonsoon	Ground water Post monsoon
1	pH	6.66	7.12
2	Electrical Conductivity	995	1089
3	Total Dissolved Solids	698	785
4	Total Hardness as caco3	513	401
5	Calcium Hardness as caco3-mg/l	221	198
6	Magnesium Hardness as caco3-mg/l	201	183
7	Na+	173	114
8	K+	4	4
9	chloride	212	221
10	suiphate	92	112
11	Nitrate	9	12
12	Fluoride	1.00	1.36
12	Fluoride	1.36	0.95

SAMPLE-11,12Location:kongarakolan village
pre monsoon Date: : : 10-04-2013, Tested on: 11-04-13,post monsoon : Date14-11-2013, Tested on: 17-11-13,

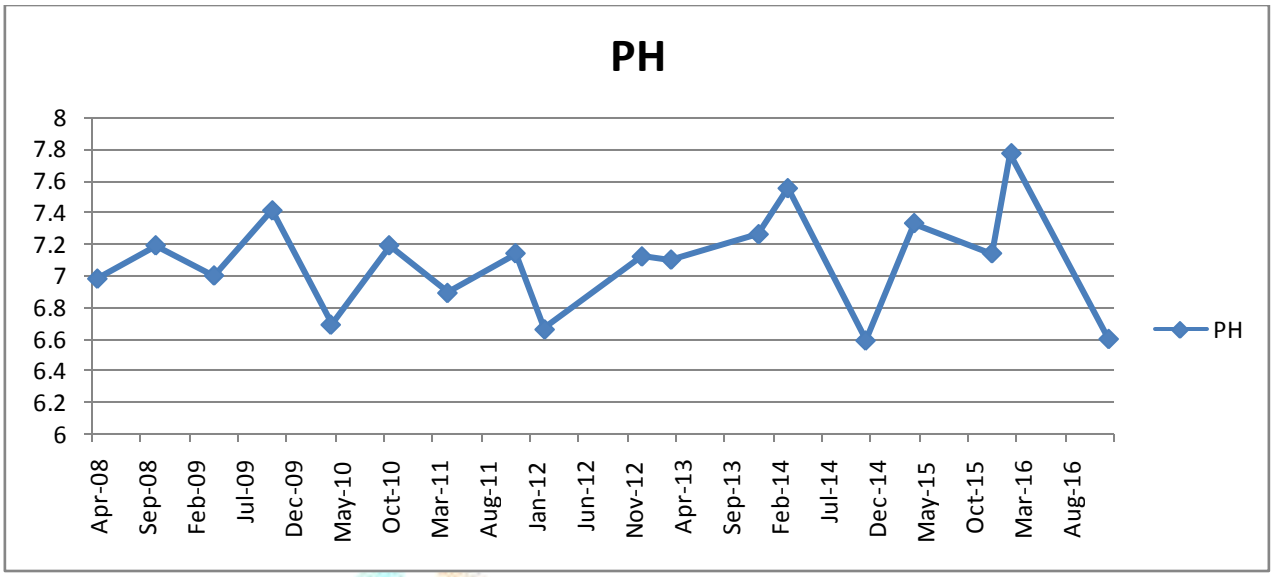
Sl.no	Characteristics	Ground water premonsoon	Ground water post monsoon
1	pH	7.1	7.26
2	Electrical Conductivity	899	1349
3	Total Dissolved Solids	614	850
4	Total Hardness as caco3	480	432
5	Calcium Hardness as caco3-mg/l	213	248
6	Magnesium Hardness as caco3-mg/l	211	193
7	Na+	142	191
8	K+	5	4
9	chloride	178	190
10	suiphate	88	80
11	Nitrate	8	5
12	Fluoride	0.99	1.24

SAMPLE-13,14Location :Nadergul village
pre monsoon Date: : : : 16-04-14, Tested on: 17-4-14,,post monsoon 14-11-2013, Tested on: 17-11-13,

Sl.no	Characteristics	Ground water pre monsoon	Ground water post monsoon
1	pH	7.55	6.59
2	Electrical Conductivity	987	1287
3	Total Dissolved Solids	681	958
4	Total Hardness as caco3	465	398
5	Calcium Hardness as caco3-mg/l	221	211
6	Magnesium Hardness as caco3-mg/l	201	198
7	Na+	88	102
8	K+	3	4
9	chloride	190	221
10	suiphate	11	95
11	Nitrate	9	12
12	Fluoride	1	0.92

SAMPLE-15,16
Location:Gandhinager
pre monsoon Date: : : 16-04-15, Tested on: 17-04-15
post monsoon Date: Date: 09-05--15, Tested on: 10-12-15,,

Sl.no	Characteristics	Ground water pre monsoon	Ground water post monsoon
1	pH	7.14	7.12
2	Electrical Conductivity	1411	1082
3	Total Dissolved Solids	910	785
4	Total Hardness as caco3	352	401
5	Calcium Hardness as caco3-mg/l	213	198
6	Magnesium Hardness as caco3-mg/l	199	183
7	Na+	5	114
8	K+	111	4
9	chloride	298	221
10	suiphate	114	109
11	Nitrate	12	12
12	Fluoride	1.22	1.22


PH
8
7.8
7.6
7.4
7.2
7
6.8
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6
Apr-08
Sep-08
Feb-09
Jul-09
Dec-09
May-10
Oct-10
Mar-11
Aug-11
Jan-12
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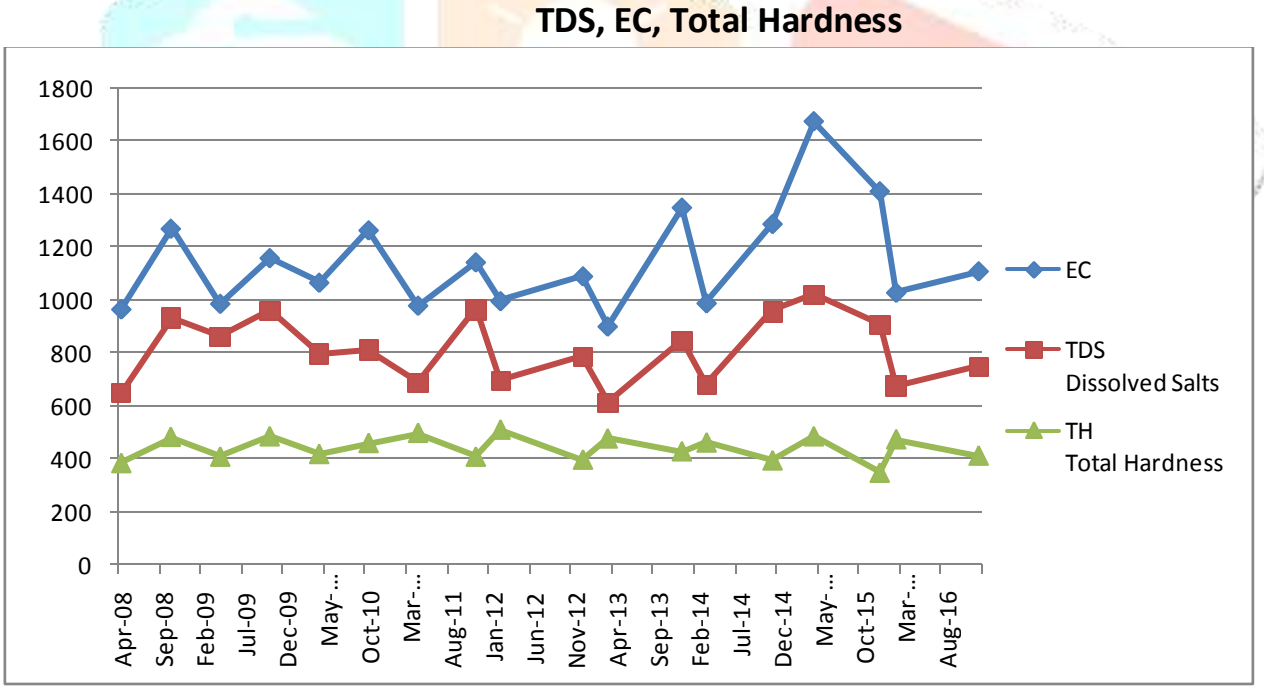
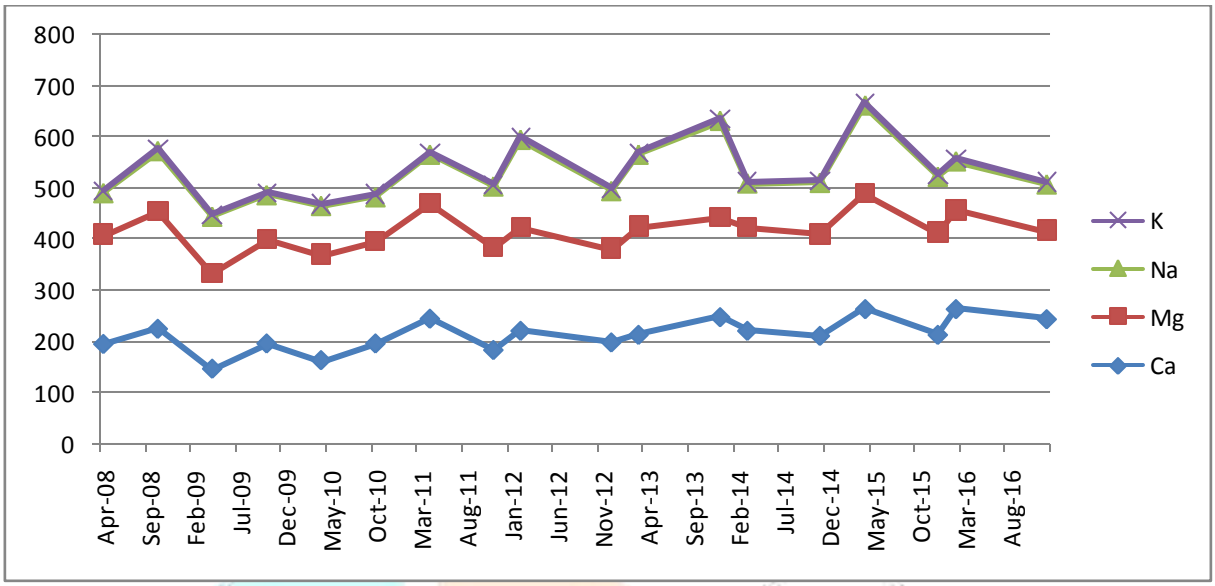
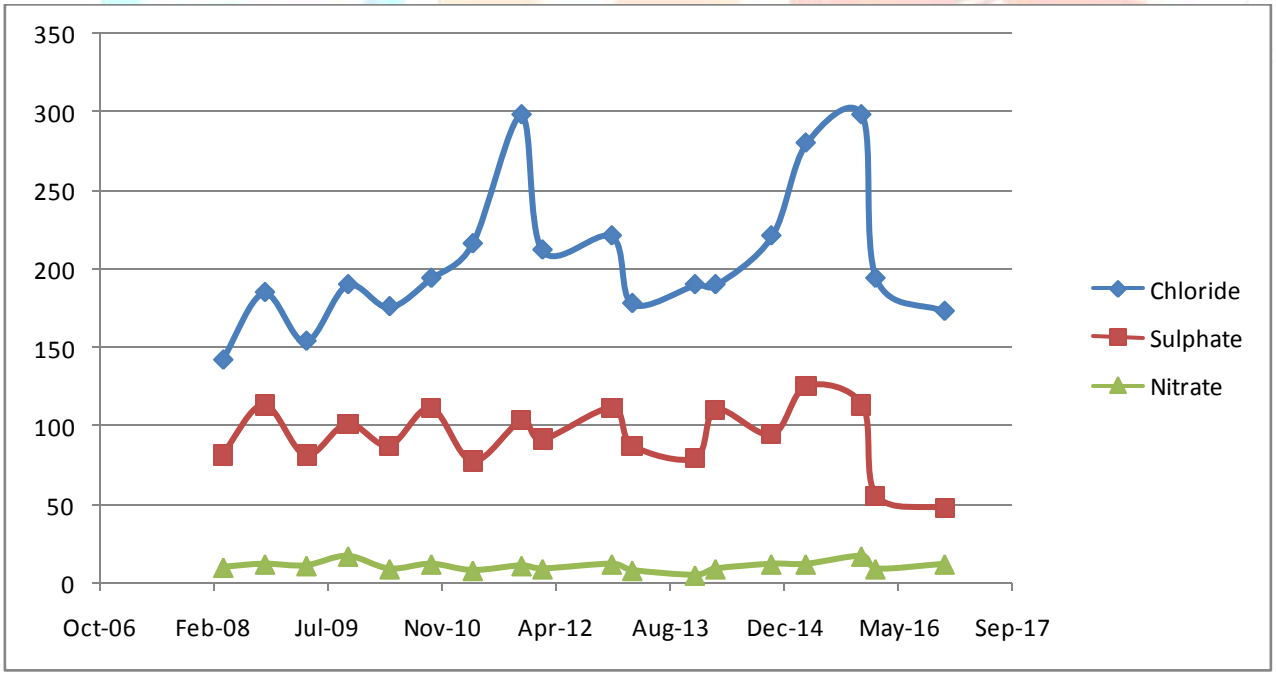
PH

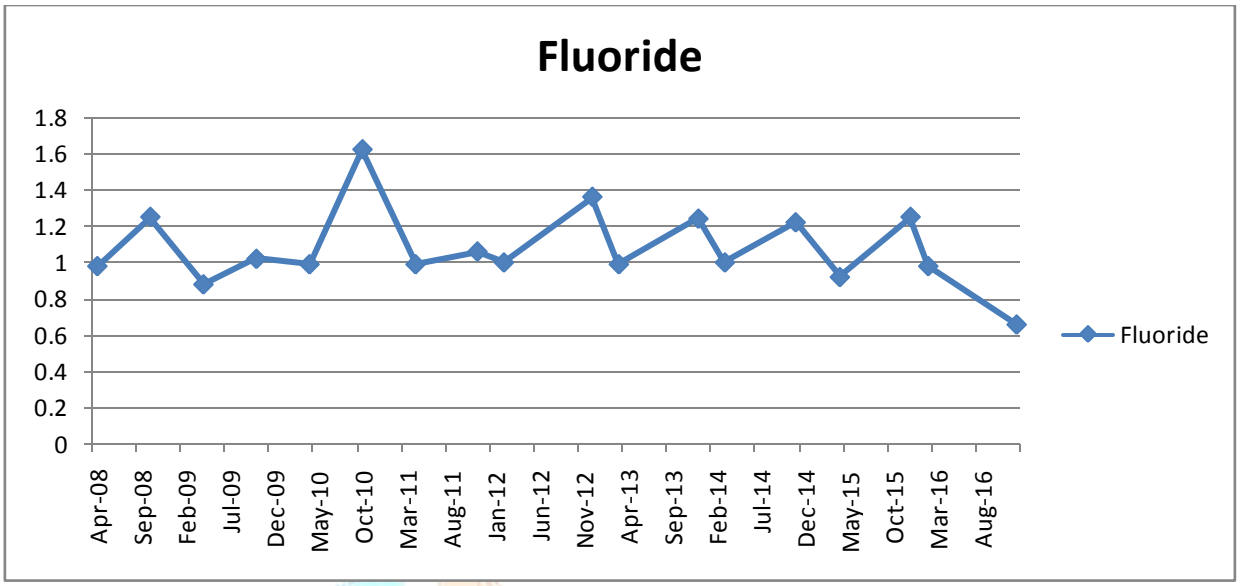

TDS, EC, Total Hardness
1800
1600
1400
1200
1000
800
600
400
200
0
Apr-08
Sep-08
Feb-09
Jul-09
Dec-09
May-...
Oct-10
Mar-...
Aug-11
Jan-12
Jun-12
Nov-12
Apr-13
Sep-13
Feb-14
Jul-14
Dec-14
May-...
Oct-15
Mar-...
Aug-16
EC
TDS
Dissolved Salts
TH
Total Hardness

Cations: K, Na. Mg, Ca



Chloride, Sulphate, Nitrate





Results and Discussions:

1. pH (6.5 to 8.5) has no direct adverse effect on health, however a lower value below 4 will produce sour taste and higher value above 8.5 a bitter taste.

2. Higher values of pH hasten the scale formation in water heating apparatus and also reduce the germicidal potential of chlorine.

3. High pH induces the formation of trihalomethanes which are causing cancer in human beings.

Electrical conductivity:

The electrical conductivity gives quantitative picture of water. The values of electrical conductivity range from 800 ***µS /cm to 1800 µS /cm*** for ground water sample. For Such anonymous values arise from various anthropogenic activities and geochemical processes prevailing in the region.

Total dissolved solids:

The weight of the residue consisting of pollutants left behind after the water sample is evaporated is a measure of TDS and gives the general nature of ground water quality and extent of contamination. The permissible limit is 500-1000ppm .The TDS value varies The high concentration may be due to leaching of solid waste from ground surface and solubility of mineral in ground water.

Total Hardness:

The total hardness is an important property indicating the quality of groundwater. The desirable limit for TH is up to 300mg/l and up to 600mg/l is The permissible limit , the sample values are various 120 to 1200 mg/liter. which leads to corrosion of steel ,vessels and plant growth, Ca &Mg affect on the Renal system(Asim Kurjak Text book on prenatal medicine in for health care).

POTTASIUM: The potassium are in their permissible rage only which may useful for mobility on ion in the body.

Concussions:

Fluoride (F-) : F- is an important element in the drinking water and although required for health, it is harmful when it exceeds the permissible limit of 1.5 mg/l in water (WHO, 2009). Low concentration of fluoride below 0.5 mg/l causes dental caries and high concentration above 1.5 mg/l may cause an endemic disease called dental fluorosis, intake of F- concentration above 3 mg/ l may cause skeletal fluorosis (WHO, 2009). The concentration of F- in groundwater ranges from 0.8 to 1.6 mg/l with an average concentration of 2.1 mg/l. Figure shows the variation of Concentration in the study area and groundwater samples are within the maximum permissible limits of drinking water standards (BIS, 2012) . From above results we can find that as the urbanition on the Nadergul vicinity the transfer of pollutant in to the ground water and changes thgw quality of ground water

Reference:

1.A. Sutharsiny, S. Pathmarajah, M.Thushyanthy, V. Meththika, Tropical Agricultural Research, 2012, 23,237-248.

2. A.M. Piper, Am Geophys Union Trans,1944, 25, 914–923.

3. A.N. Strahler, (Eds.), Handbook of AppliedHydrology. McGraw-Hill, New York, 1964, pp 4.39-4.76

4. AWWA, Mc Graw Hill, New York, 1971,

5. B.I. Odoh, A.U. Utom, H.N. Ezeh, B.C.E. Environ Sci, 2012 19,1–9.

6. B.K. Kortatsi, Aquat Geochem, 2007, 13,41–74.

7. BIS, 2nd revision of 2012, 10500, 2012.

8. Bo.Olofsson, J. Mattsson, Proc. 33rd IGC,2008.

9. C.N. Sawyer, D.L. McCarty DL, (Eds.),

New York: McGraw-Hill, 1967, p 518.

10. E. Vetrimurugan, L. Elango, Water Qual.Expo. Health, 2015, 7, 125-141.

11. F.M. Eaton, Soil Science, 1950, 69, 127-128.

12. G.A. Daghrah, Asian. J. Earth, Sci, 2009,2, 28–38.

13. G.K. Anudu, S.E. Obrike, L.N. Onuba, A.E.Ikpokonte, Res. Jour. of Appl. Sci, 2011,

6,128-135.

14. H.M. Raghunath, Groundwater. WileyEastern, New Delhi, 1987.