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Study of Chloride in Water around Ambarnath Town, Maharashtra, India

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Abstract

Ambarnath town is part of Thane district of Maharashtra. For study purpose six ground water samples around Ambarnath Chikloli-Morivali industrial area were collected during July 2013 to December 2013.Collected Samples were analysed throughout 6 months for Chloride parameter. Obtained results compared with the standards given by WHO &BIS.

Chloride in study area was found between 96.56 mg/l to 129.22 mg/l. In whole study period, Bhimnagar area open well always shown higher value of chloride compared to other sites indicates effect of manmade activities.

Keywords: Chloride, Industrial area, manmade activity, parameter, groundwater

Introduction

Groundwater resources support many town, rural and distant communities around Australia. It is used as a drinking water source; for irrigation in agriculture, industrial development and indirectly, through ecosystem and stream flow maintenance. About 32% of groundwater is extracted for urban industrial use, 51% for irrigation and 17% for stock watering and rural use but this varies by state.[1]

It has been estimated that India, Nepal, Bangladesh, Pakistan and China use over 300 billion m^3 of ground water annually, which is mostly in agriculture. India is the largest user of ground water. Presently about 65 % of the irrigation and about 90 % of the domestic and industrial water requirements are met through private ground water resources. Use of ground water is becoming unsustainable day-by-day. The fall in ground water level and deterioration in quality gives rise to drinking water shortages.[2]

About 50% of all the underground water used in urban areas of developing countries is obtained from wells, springs and bore holes and more than 1000 million populations in Asia and 150 million in Latin America depend on such resources.[3]

Population on earth has been increasing in alarming rate, which demands safe drinking water. Groundwater is a major source of water all over the world. The physical and chemical properties of groundwater make it a reliable source throughout the world. Groundwater plays variety of roles in day-to-day life, which makes it an important resource for human beings.

Water quality depends on the natural physical and chemical status of the water as well as any alterations that may have occurred as a consequence of human activities. Anthropogenic activities cause

serious groundwater contamination; therefore, it is important to analyse the ground water as well as water quality in different parts of the India, before using it for any purpose.[4]

Day by day population around the town is increases, so it's important to detect the quality of groundwater, therefore Ambarnath town was selected for study purpose.Ambarnath is an industrially developed town from Thane district of Maharashtra. Around industrial area, residential and slum areas are present, therefore an attempt is made to find out the chloride present in the groundwater.

Material and method

For study purpose six sites around main Ambarnath town were selected. Water samples were collected monthly from selected sites during July 2013 to Dec.2013. Following sites were selected for study purpose.

Table 1- Sampling sites with station no.

Sr.No.	Sampling area	Station no.
1	Kansai Gaon (Ganesh chauk) Open Well	S1
2	Kansai Hand Pump	S2
3	Bhimnagar Area,Open Well	S3
4	Vadavli area (Service centre) Bore Well	S4
5	Bhendipada area Bore Well	S5
6	Samarth Service Centre Bore Well	S6

Samples were collected in clean glass bottles. The bottles were rinsed with the groundwater to be taken for analysis. Collected samples were analysed for Chloride parameter by using Argentometric method. Chloride ions can be conveniently estimated by titration with silver nitrate in the presence of chromate ions. Silver nitrate forms silver chloride by reacting with the ions present in water. When the chloride in water gets exhausted, silver nitrate then reacts with the CrO_4 - to show a red colour of silver chromate indicating that the titration has been completed.

In 50 ml of sample 2 ml of Potassium Chromate Solution was added. The contents were titrated against 0.02 N AgNO3 until a persistent red tinge appeared.[5]

Obtained results from different sites compared with the standards given by CPCB for Chloride.

Calculation

$$\text{Chloride (mg/l.)} = \frac{(mlxN\quad)ofAgNo\quad 3x1000\quad x35.5}{mlofsample}$$

Results and Discussion

After analysis obtained results were shown in table no.2.

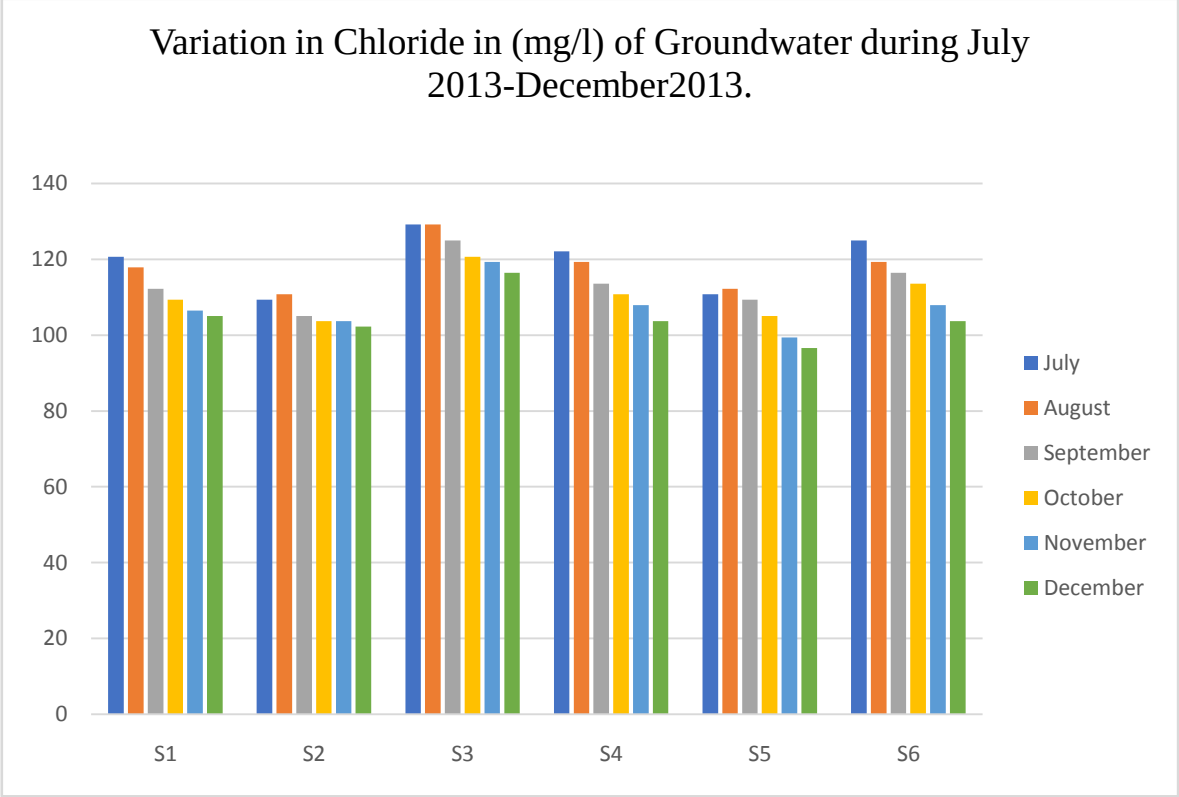
Table No. 2: Obtained results from July2013 to December 2013

Station No.	July	August	September	October	November	December
S1	120.7	117.86	112.18	109.34	106.5	105.08

S2	109.34	110.76	105.08	103.66	103.66	102.24
S3	129.22	129.22	124.96	120.7	119.28	116.44
S4	122.12	119.28	113.6	110.76	107.92	103.66
S5	110.76	112.18	109.34	105.08	99.4	96.56
S6	124.96	119.28	116.44	113.6	107.92	103.66

Chloride in Ambarnath ground water varied from 96.56mg/l to 129.22 mg/l. All six sampling sites were found within desirable limits given by BIS and WHOi.e.250 and 200-300(Taste Threshold value) respectively; indicates less contamination.
Chloride in surface and ground water coming from both natural and anthropogenic sources such as the use of inorganic fertilizers, septic tank effluents, industrial effluents, animal feed, and landfill. Chloride levels in unpolluted waters are often found below 10 mg/l.[6,7].

At station no.5(S5-Bhendipada area Bore Well) (Kansai Hand Pump) in the month of December.2013 shown lowest chloride values and station No.S3 shows highest value of chloride in the July and August 2013.



Conclusion

At all six sampling sites, chloride value observed within desirable limits given by BIS and WHOindicates less effect of anthropogenic activities on groundwater.During study period Station No.S3 i.e. Bhimnagar area open well shown more chloride level compared to other sites. Bhimnagar area open well, has some sources of contamination compared to other sites. As station no.S3 is open well, from one side well is surrounded by slum area where local people are throwing garbage in nearby well area

and from another side it's having railway track; having more chances of contamination from surrounding area compared to bore well and hand pump.

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