Asian Science e ISSN–0976–7959 Volume 9 | Issue 1&2 | June & December, 2014 | 12-15 DOI : 10.15740/HAS/AS/9.1and2 /12-15
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RESEARCH PAPER

Studies of physico-chemical parameters of different villages of Latur district, Maharashtra (India)

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ABSTRACT

The ground water quality of different villages of district Latur analized and determined the physico-chemical parameter and the water sample collected in the high grade plastic bottles of one litre and brought to lab for analysis. The parameter studied are pH, tubidity, total dissolved solids and total hardness fluorides, chloride, calcium, magnesium sodium, potassium, Iron etc. The results were compared with standards prescribed by WHO and ISI. It was found that water of few villages is contaminated like Babhalgaon and Deokara. But the data of few villages revealed that the water quality is fit for drinking such as Ahemadpur, and andhori etc.

Key Words : Ground water quality, Physico-chemical parameters, TDS, Fluoride

View point paper : Hussain, Sayyed, Tirpude, H.A. and Mane, Vinod (2014). Studies of physico-chemical parameters of different villages of Latur district, Maharashtra (India). *Asian Sci.*, **9** (1&2): 12-15.

Water is a very important for life and it appears in nature in all three common states of matter (solid, liquid, and gas) but the safe drinking water is essential to humans and other forms of life even though it provides no calories or organic nutrients. It is a good polar solvent and is often referred to as the universal solvent and the substances that dissolve in water e.g., salts, sugars, acids, alkalis, and some gases. Water is an essential nutrient and is a vital component of every cell, tissue, and organ in the body. Water is the most abundant compound in the human body so the quality of water is an important factor in development and use of ground water as resources (Ara *et al.*, 2003 and Arain *et al.*, 2008). Groundwater is water stored under the surface of the ground water covers 71 per cent of the earth's surface and is vital for all known forms of life (Dahiya and Kaur, 1999; Jayawardanaa *et al.*, 2010; Jena *et al.*, 2012 and Jerker and Georgia, 2004). On earth, 96.5 per cent of the planet's water is found in oceans, 1.7 per cent in groundwater, 1.7 per cent in glaciers and the ice caps of Antarctica and Greenland, a small fraction in other large water bodies, and 0.001 per cent in the air as vapour, clouds (Kumar *et al.*, 2013; Lawson, 2011; Mumtazuddin *et al.*, 2009; Murhekar, 2011 and Rathore *et al.*, 2009). Only 2.5 per cent of the earth's water is freshwater, and 98.8 per cent of that water is in ice and groundwater. Less than 0.3 per cent of all freshwater is in rivers, lakes, and the atmosphere, and an even smaller amount of the earth's freshwater (0.003%) is contained within biological bodies and manufactured products. water quality levels including Total Dissolved Solids (TDS), Total Suspended Solids (TSS), pH, and Turbidity and colour, odour and other physico-chemical parameter to ensure that the drinking water remains inside accepted safe levels.

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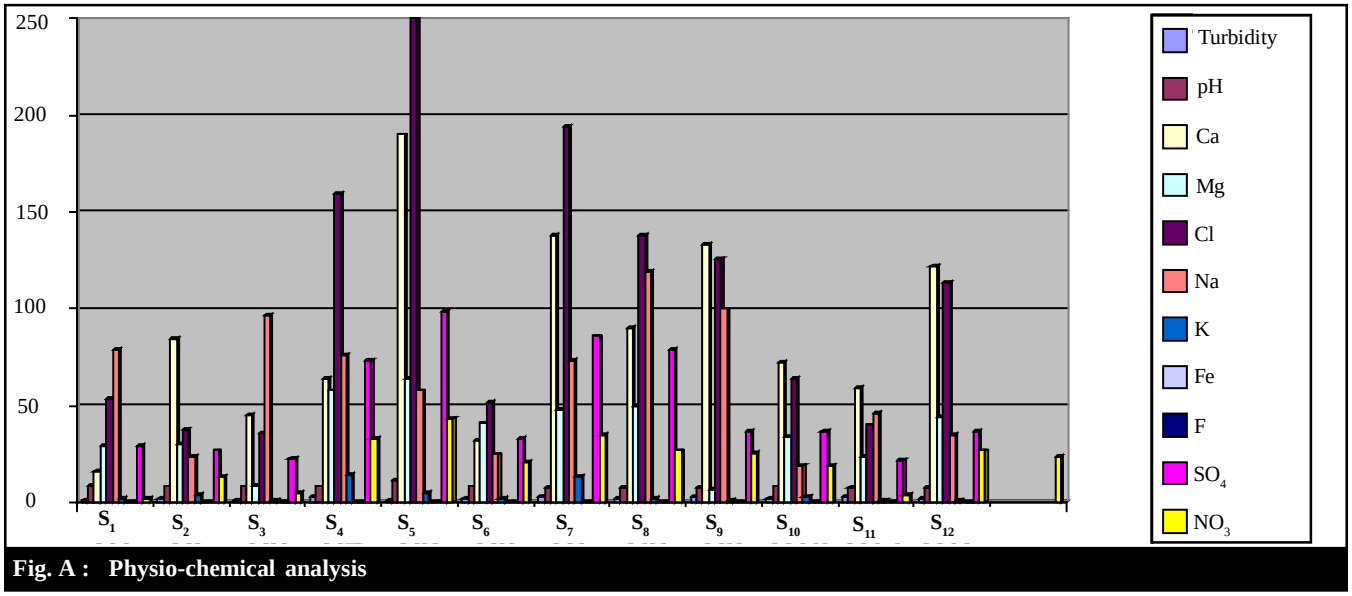

Fig. A : Physio-chemical analysis

RESEARCH METHODOLOGY

The people uses open well water, tube well water and municipal water for their daily requirement of water so the samples from open well, tube well as well as municipal water. Sixteen water samples were collected from different sites of district Latur region. All the samples collected in the morning into a high grade one litre plastic bottles in the month of Dec., 2012 and brought immediately to the lab for physico-chemical examinations by using standard methods. The analysis was carried out for various parameters such as pH, temperature, turbidity, TDS, total hardness (TH), calcium (Ca++), magnesium (Mg++), sodium (Na+), potassium (K+), chloride (Cl^-), fluoride (F) nitrate (NO_3) etc. (Fig. A).

RESULTS AND REMONSTRATION

The physico-chemical parameters of the water sample of various villages of district Latur shown in Table 1. All the parameters expressed in mg/l except pH and turbidity (NTU).

Temperature (T) in ^{0}C :

Temperature is an important factor because of its influence on water chemistry. The rate of chemical reactions generally increases at higher temperature. In this study the temperature of the collected water from the different villages shown in Table 1. Is 29^{0}C during study period. Similarly, the sample were odorless and colourless.

pH :

It is one of the most common water quality tests performed. The pH indicates the sample's acidity and alkalinity but is actually a measurement of the potential activity of hydrogen ions (H+) in the sample. When acid water (water with low pH values) come into contact with certain chemicals and metals, this often makes them more poisonous than normal. In the analysis it is observed that the pH of the babhalgaon is higher than the standard limit of ISI *i.e.* 6.5 to 8.5 and the pH of all other areas is between the standard limit.

Turbidity :

The American Public Health Association (APHA) defines turbidity as the optical property of a water sample that causes light to be scattered and absorbed rather than transmitted in straight lines through the sample. The APHA specifies drinking water turbidity shall not exceed 0.5 NTU. In the analysis of sample of Haibatpur village the turbidity is higher than the standard value.

Total dissolved solids :

It represents the total concentration of dissolved substances in water. TDS is made up of inorganic salts, as well as a small amount of organic matter. Common inorganic salts that can be found in water include calcium, magnesium, potassium and sodium, which are all cations, and carbonates, nitrates, bicarbonates, chlorides and sulfates, which are all anions. Cations are positively charged ions and anions are negatively charged ions. The data obtained after analysis studies the TDS of villages chincholirao(1312 mg/l) and kharosa (1119 mg/l) is above the standard range of ISI and WHO.

Total hardness :

Hard water is water that contains high levels of

Table 1 : Result of physico-chemical parameters of different regions of district Latur

Sr. No.	Village	Temp	Color	Odour	Turb	PH	T.D.S	T.H	Ca	Mg	Cl	Na	K	Fe	F	SO_4	NO_3
1.	Ahemadpur	26	cl	ol	1.2	8.5	351	160	16	29	54	79	2	0.14	0.20	29	2
2.	Andhori	26	cl	ol	2.2	8.2	392	336	85	30	38	24	4	0.09	0.15	27	13
3.	Arasnol	26	cl	ol	2.1	8.2	394	148	45	09	36	97	1	0.10	0.20	23	5
4.	Ashta	26	cl	ol	1.2	8.3	324	400	64	58	160	76	14	0.12	0.40	73	33
5.	Babhalgaon	26	cl	ol	3.2	11.9	920	744	190	64	250	58	5	0.09	0.15	99	43
6.	Bhadi	26	cl	ol	1.2	8.3	340	252	32	41	52	25	2	0.08	0.15	33	21
7.	Bhise wagholi	26	cl	ol	2.1	7.7	797	544	138	48	194	73	13	0.08	0.20	86	35
8.	Chikurda	26	Cl	ol	3.4	7.7	733	432	90	50	138	119	2	0.05	0.35	79	27
9.	Deokara	26	cl	ol	2.2	7.8	639	360	133	07	126	100	1	0.09	0.10	37	26
10.	Dhalegaon	26	cl	ol	3.1	8.2	418	320	72	34	64	19	3	0.07	0.20	37	19
11.	Gharani	26	cl	ol	2.2	8.0	421	248	59	24	40	46	1	0.06	0.10	22	4
12.	Haibatpur	26	cl	ol	2.9	7.9	630	488	122	44	114	35	1	0.11	0.30	37	27
13.	Khandali	26	cl	ol	2.5	8.1	177	132	24	19	24	13	4	0.09	0.30	15	2

Abbreviation:- cl- colourless, ol- odourless, turb- turbidity, TDS- total dissolve solid, TH- total hardness, Temp- temperature

dissolved calcium, magnesium, and other mineral salts such as iron. The greater the amount of dissolved minerals in the water is harder. The hardness of some villages are under the standard range but other villages like Astha (400), Babhalgaon (744), Bhise wagholi (544), Chikurda (432), chincholirao (984) and Kharosa (708) are out of the range.

Calcium :

The calcium standard range given by the WHO is 100 mg/l, so according to the standard range. The villages are out of the standard range are Babhalgaon (190 mg/l), Bhise wagholi (138 mg/l), Chincholirao (285 mg/l), Deokara (133 mg/l), Haibatpur (122 mg/l) and Kharaosa (150 mg/l).

Magnesium :

It is also responsible for hardness of water. Magnesium content in the investigated water samples are under the standard range of WHO.

Chloride :

The chloride ion concentration is higher in organic wastes and its higher level in natural water is indication of pollution from domestic sewage. In the present analysis the sample of Kharosa village has the higher concentration of chloride found above the standard values of WHO and ISI.

Sodium :

Sodium is a active metal and it does not found in a free state. It always in combined with other substances. In the human body, sodium helps to maintain the water balance. In the analysis it is found that the concentrations of Sodium in lower range than the prescribed limit of WHO and ISI.

Potassium :

Potassium is used as a replacement for salt in the body. Its concentrations in water are generally very small. Although excessive amounts may have a laxative effect, it is found that the content of potassium is higher in the water sample of Kharosa (65 mg/l).

Iron :

In the water sample of the all villages iron concentration below the 0.3 mg/l standard range prescribed by ISI and WHO.

Fluoride :

If the high amount of fluoride intake through drinking water can causes fluorosis . In the present analysis, fluoride concentration was found in all samples of the latur villages are below the standard value of ISI and WHO.

Sulphate :

All the sample have the sulphate concentration in the

range of WHO and ISI standard.

Nitrate :

Groundwater can also be contaminated by sewage and other wastes rich in nitrates. But the recent study of nitrate concentration in the water sample of all villages of dist Latur is below the standard range. Similar work related to the present investigation was also carried out by Ibrahim *et al.* (2009); Patel and Patel (2012); Sharma *et al.* (2012) and Shinde *et al.* (2011).

Conclusion :

It was found that water of few villages is not fit *i.e.* of Babhalgaon, Deokara, Bhise Wagholi, Chikhurda because total hardness and percentage of chlorine found was more. But the data of few villages revealed that the water quality is fit for drinking water such as Ahemadpur, and Andhori etc.

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Received : *19.06.2013;* **Revised :** *24.10.2014;* **Accepted :** *09.11.2014*