



# The Institute of Health Systems – Laboratory

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## Water Analysis Report

Sample Id: CB03575

Received date: 02-12-2024, time: 14:04.

Report No. CB03575DT09-07-2024

### I. Description of Sample

The IHS Laboratory advises all clients to follow methods of sampling specified in IS3025 part-1:1987 for chemical tests and in IS1622:1981 for bacteriological tests or such other standards as applicable. However, each sample is collected in a specific context, under prevalent feasibility considerations. The following details about source of sample(s) and collection method is based on information gathered from the sample collector and the client, to aid interpretation of test results.

Place & description of source, sampling point & sample container: Vivekananda School, Urella Road, Chevella-501503. **R.O Water.** Water bubbles are supplied by a private vendor. A water sample was collected from a 20L water bubble into an empty fancy water bottle.

Sample collection date: 02-12-2024 , time: 11:50 AM, by Mr. Sandeep Kumar,  
M:9573897839.

External temperature of sample container on receipt: 27.2°C.

Other samples from same client: Nil. Past tests for same source, if any: Nil

Test Requested by: Vivekananda School; M:9613138888; Email:  
vdckukatpally@gmail.com, viscbscchevelle@gmail.com.

Client Concerns: *To Know the quality of water.*

Desired Test Package & Code: Bottled Water Potability (BWP)

### II. Test Results from Chemical Laboratory (Chem Lab)

Test Dates: Physical: 02-12-2024 to 03-12-2024 ; Chemical: 02-12-2024 to 06-12-2024.

#### A. Physical & Sensory Characteristics:

Sl	Parameter	Result	Units	IS10500 Ref. Values	
				Acceptable	Permissible
1	Apparent Colour	Colourless	Rating	Colourless	--
	True Colour	<1	PCU (Hazen)	5	15
2	Odour	Odourless	Rating	Agreeable	Agreeable
3	Turbidity	0.10	NTU	1	5
4	pH at 25°C	6.06	pH Value	6.5 to 8.5	No relaxation
5	Electrical conductivity (EC)	115.1	µ Siemens/cm	≤ 2250 (CPCB, Class-E)	

<sup>1</sup> Apparent Colour as per IS3025Pt4 2.7.1 & True Colour, as per IS3025 Pt-4 2.7.2 platinum cobalt visual comparison of filtered (0.45µ) sample. Detection limit: 1 Platinum Cobalt Units (PCU) aka Hazen Units.

<sup>2</sup> Odour rating by lab personnel: Odourless, Agreeable or Disagreeable (Unpleasant or Offensive).

<sup>3</sup> Turbidity est. as in IS3025Pt10, using HI98703 Nephelo-Turbidimeter. Detection limit: 0.10NTU.

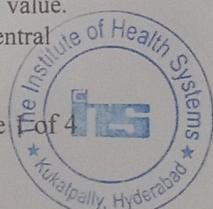
<sup>4</sup> pH value at 25°C as per IS3025Pt11, by Hanna HI2002-02Edge (pH) instrument. Detection limit: 4 pH value.

<sup>5</sup> EC at 25°C as per IS3025Pt14, by Hanna HI2003-02EdgeEC. Detection limit: 1 µ Siemens/cm. The Central

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Pollution Control Board (CPCB) best use classes A-C, which include drinking water do not specify any guideline value for EC. The CPCB reference value shown here is for a lower class-E, best use case of irrigation water. <https://cpcb.nic.in/water-quality-criteria/>

### B. General Chemical Characteristics:

Sl	Parameter	Result	Units	IS:14543: Packaged drinking water	IS10500: Any Drinking Water
1	Total Alkalinity	60	As CaCO <sub>3</sub> mg/L	Max 200	200
2	Total Hardness	34	As CaCO <sub>3</sub> mg/L	--	200
3	Calcium	6.41	As Ca <sup>++</sup> mg/L	Max 75	75
4	Magnesium	4.37	As Mg mg/L	Max 30	30
5	Nitrite	0.004	As NO <sub>2</sub> mg/L	Max 0.02	3.0 (WHO)
6	Nitrate	14.89	As NO <sub>3</sub> mg/L	Max 45	45
7	Chloride	14.67	As Cl <sup>-</sup> mg/L	Max 200	250
8	Fluoride	0.18	As F <sup>-</sup> mg/L	Max 1.0	1.0
9	Sulphate	8.40	As SO <sub>4</sub> mg/L	Max 200	200
10	Iron	BDL	As Fe mg/L	Max 0.1	1.0
11	Manganese	BDL	As Mn mg/L	Max 0.1	0.1
12	Sodium	9.42	As Na <sup>+</sup> mg/L	Max 200	--
13	Potassium	0.42	As K <sup>+</sup> mg/L	--	--

BDL: Below detection level

- <sup>1</sup> Total alkalinity by titration as in IS3025Pt23 with 20ml sample. Detection limit: 5mg/L.
- <sup>2</sup> Total hardness (TH) by EDTA titration of 50 ml sample, ammonia buffer & EBT indicator as in IS3025Pt21. Detection limit: 5mg/L.
- <sup>3</sup> Calcium by EDTA titration of 50 ml sample, NaOH, P&R indicator as in IS3025Pt40. Detection limit: 2mg/L
- <sup>4</sup> Magnesium estimate is derived from Hardness & Calcium, following IS3025Pt46. Detection limit: 2mg/L.
- <sup>5</sup> Nitrite as NO<sub>2</sub> mg/l, by APHA 4500-NO<sub>2</sub>-Colorimetric. The reference value for NO<sub>2</sub> shown here is based on WHO guideline. No specification for Nitrite in IS10500. Detection limit: 0.01mg/L.
- <sup>6</sup> Nitrate by UV spectrophotometric screening as in APHA 4500-NO<sub>3</sub>B. Detection limit: 0.10mg/L.
- <sup>7</sup> Chloride by titration of 100 ml sample with 0.0141N AgNO<sub>3</sub> & K<sub>2</sub>CrO<sub>4</sub> indicator as in IS3025Pt32. Detection limit: 2mg/L.
- <sup>8</sup> Fluoride by APHA 4500-F- D. SPADNS method. Detection limit: 0.10mg/L.
- <sup>9</sup> Sulphate by IS3025Pt24 Turbidity method based on nephelometry. Detection limit: 4mg/L.
- <sup>10</sup> Iron is by IS:3025Pt53(R2014), Phenanthroline, direct determination of soluble iron. Detection limit: 0.02mg/L
- <sup>11</sup> Manganese by IS:3025Pt59(R2017), Formaldoxime Spectrophotometry. Detection limit: 0.02mg/L.
- <sup>12</sup> Sodium by flame photometry as in IS3025Pt45; Detection limit: 0.10mg/L.
- <sup>13</sup> Potassium by flame photometry as in IS3025Pt45; Detection limit: 0.10mg/L.

End of II: Chemical Lab Report

### III. Test Results from Microbiology Laboratory (Bio Lab)

Test dates: start: 02-12-2024, end: 05-12-2024.

### C. Bacteriological Analysis:

Sl	Parameter	Result	Units	IS:14543: Packaged drinking water	IS10500: Any Drinking Water
1	Total coliforms	79(25,187)	MPN/100ml(95%CI)	Absent	--



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Sl	Parameter	Result	Units	IS:14543: Packaged drinking water	IS10500: Any Drinking Water
2	Thermotolerant coliforms	Absent	Absent / Present	Absent	Absent
3	<i>E. coli</i>	Absent	Absent / Present	Absent	Absent

<sup>1</sup> Most probable number (MPN) & 95% Confidence Interval (CI), based on 48h incubation of 5 MacConkey broth culture tubes for each of 3 (10, 1 & 0.1 ml) dilutions, using IS1622-1981(RA-2019) App-B, Table-3.

<sup>2</sup> Inoculation of total coliform positive sample from a minimum dilution tube, into HiMedia brilliant green lactose broth (BGLB), & 24h water-bath-incubation at 44°C. Gas formation indicates thermo-tolerant coliforms.

<sup>3</sup> Inoculation of total coliform positive sample from a minimum dilution tube, into HiMedia tryptone water, & 24h water-bath-incubation at 44°C. Pink ring upon adding Kovac's reagent indicates *E. coli*.

End of III: Bio Lab Report

#### IV. Notes and Recommendation

##### 1. Notes

- a. The IS14543, first published in 2004, applies to water from various sources, treated and packaged for drinking. IS10500, originally published in 1983 and revised in 2012 has been developed for safe water supply to general public by municipal and other water utilities and is applicable to treated as well as untreated drinking water from any source. IS10500 specifies two reference values, namely; acceptable limits and permissible limits in the absence of alternative sources with acceptable values. The IS10500-reference values shown in various results table in this report are the acceptable limits
- b. EC & TDS: Although, EC and TDS are both indicators of salinity, their relationship is not linear. The EC to TDS ratio ranges from 0.5 to 0.75 for fresh and natural waters; and is usually higher (0.7 to 0.89) in case of brackish or seawater (Rusydi, 2018).
- c. Hardness: The US Environment Protection Agency (USEPA 1991) classifies hardness of waters as (a) Soft: 0 to 75 mg/L, (b) Moderately hard: 76 to 150 mg/L, (c) Hard: 151 to 300 mg/L, and (d) Very hard: >300 mg/L. According to WHO Guidelines (2011), consumers, in some cases, may tolerate hardness in excess of 500 mg/l. Formula to compute hardness components from total alkalinity (TA) and total hardness (TH): Carbonate (temporary) hardness (CH): If TH > TA, then CH = TA; else, if TH ≤ TA, then CH = TH (and NCH=0). Non-carbonate hardness (NCH): If TH > TA, then NCH = (TH-TA), else NCH= 0.
- d. Calcium & Magnesium: According to WHO guidelines drinking water can be a contributor to Ca & Mg intake and could be important for those who are marginally deficient of these minerals. There is insufficient data to suggest either min or max concentrations of Ca or Mg at this time, as adequate intake will depend on a range of other factors. Therefore, no guideline values are proposed (by WHO) for hardness, Ca & Mg (WHO, 2011).
- e. Nitrate (NO<sub>3</sub>): The WHO drinking water guideline value for nitrate is 10mg of Nitrate-Nitrogen (NO<sub>3</sub>-N) / L. This is equivalent to  $10 \times 4.4268 = 44.268$  mg of NO<sub>3</sub>, which is almost the same as the IS10500 guideline value of 45 mg/l of NO<sub>3</sub>.

2. Physical-sensory characteristics and observed values of chemical parameters as well as microbial characteristics tested in this case are within acceptable limits for human consumption.

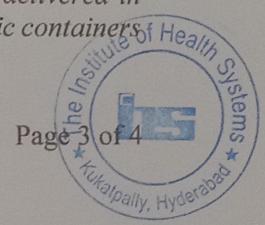
3. However, the water is soft, and its mineral content is low.

- a. Waters with hardness of less than 60 mg of calcium carbonate per litre (soft water) are aggressive (WHO 2011, p501). The aggressive water is corrosive. It leaches metals and other materials from containers and utensils. Hence, this water should be stored and delivered in nonmetallic food grade plastic, appropriate grade stainless steel, enameled metallic containers designed for the intended food processing operations.



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- b. Low-mineral content water may taste poorly and has also been reported to be less thirst quenching.
  - c. Some researchers have recommended that, the minimum level of calcium in drinking water should be 20 mg/L and the optimum should be 50 (40-80) mg/L. Similarly, the minimum level of magnesium in drinking water should be 10 mg/L and the optimum level should be about 20-30 mg/L (Kozisek, 2005, Pages 156-57). The Expert Committee constituted by the National Green Tribunal recommended a TDS level of 150mg/L for RO treated drinking water.
4. Ideally, a sample for bacteriological analysis should have been collected in a presterilised bottle. This sample was collected in an empty water bottle. However, the chances of environmental contamination of packaged water bottle is low. The presence of total coliforms is probably due to heterotrophic organisms acquired during the process of transferring into the sample collection bottle. The presence of total coliforms by itself does not imply an imminent health risk.
5. This water is ***potable, i.e., fit for drinking***, preferably for short periods and/or to meet occasional needs. For example, Tourists & people in transit; Guests, visitors & personnel in any establishment, Clubs & Restaurants; Day scholars in an educational institution; Short stay institutions, like hospitals; Special Events, and Occasional domestic needs. However, regular, i.e., long-term consumption and complete dependence on low-mineral content water is not advisable.

Dr. Prasanta Mahapatra, Director

Test results are given only in relation to sample(s) tested for desired test service & based on sampling information provided by the client. The test report shall not be reproduced except in full, without prior written approval of the laboratory.

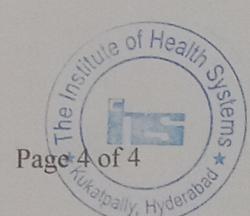
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