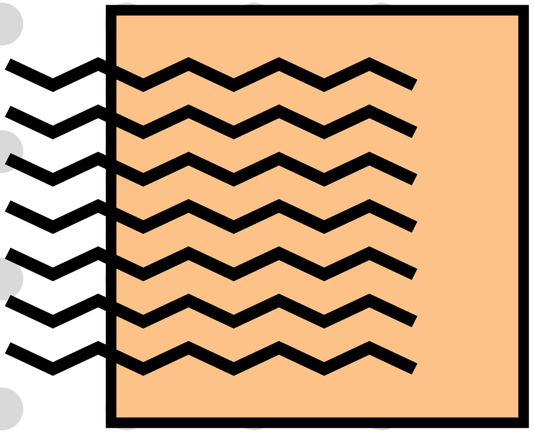
HYDRO INFORMATICS



INDIVIDUAL TASK ASSESSMENT

Mareddy Sriharshitha
2021101067

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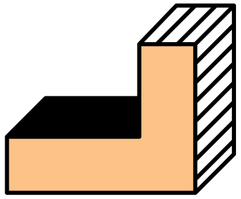
INTRODUCTION

- Water, the essence of life, serves as the cornerstone of ecological stability and human sustenance.
- The quality of water, intricately intertwined with environmental health and human well-being, stands as a pivotal concern.
- We had an issue related to Drinking water quality and typhoid cases back in Jan-Apr 2023. My aim is to study water quality in Hostels of IIITH.

DRINKING WATER QUALITY IN OBH, BAKUL



DATA COLLECTION

Nodes Deployed in Bakul, OBH

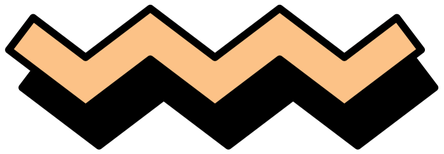
Collected from node deployements at Bakul, OBH in March 2023 for course project of CCIOT.

Link: https://docs.google.com/spreadsheets/d/17LvnweuubWSEaF_5EthTtrqabRqBJBVn0boNtJ54U1w/edit#gid=0

Data collected from IIITH Official Mails via Outlook

Link: https://docs.google.com/spreadsheets/d/1k0lGPqWOghDhGhrLx5y-iAZeg0Nf7J5oqApt5-ZUyrs/edit#gid=0

WATER QUALITY FACTORS

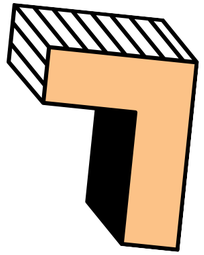


- TOTAL DISSOLVED SALTS (TDS)
- pH VALUES
- TEMPERATURE

WHAT TDS IS IN WATER?

- TDS stands for Total Dissolved Solids and refers to the total concentration of dissolved substances in drinking water.
- TDS comprises inorganic salts and a small amount of organic matter as well. Inorganic salts are made up of the positively charged cations (calcium, magnesium, potassium and sodium) and negatively charged anions (carbonates, nitrates, bicarbonates, chlorides and sulfates).
- The TDS level is how much of the total dissolved solids are present in the water.

WHY DO YOU NEED TO MEASURE TOTAL DISSOLVED SOLIDS?

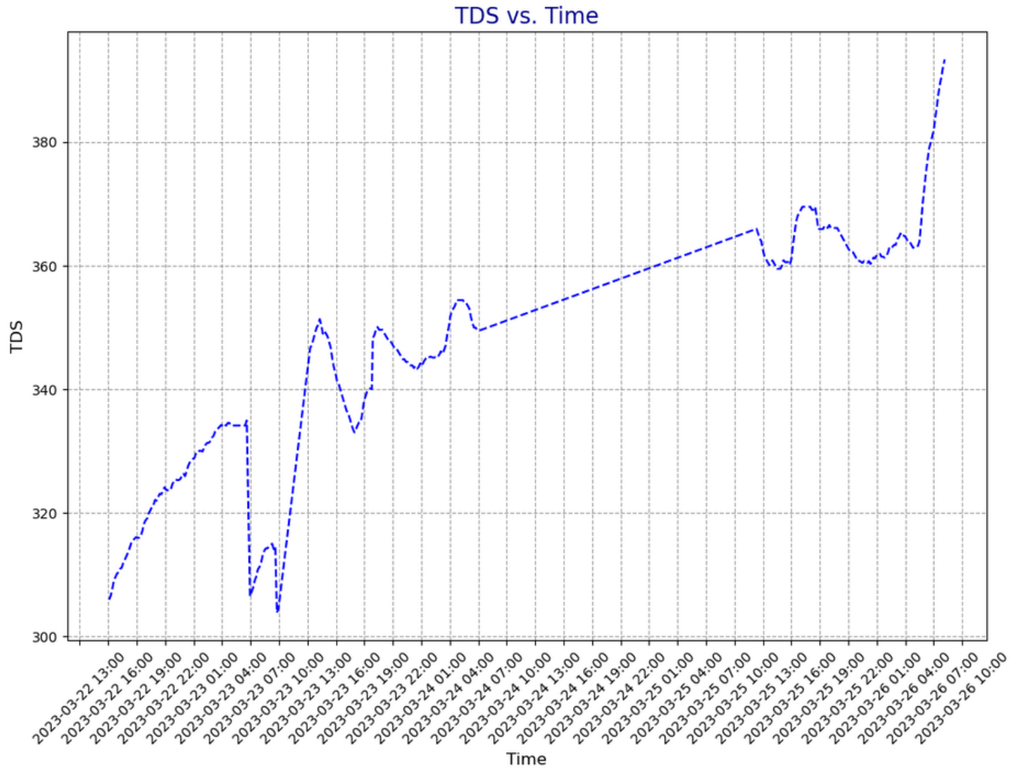


- **Taste:** High levels of TDS in water affect the taste of your drinking water. Your water may taste bitter, salty or sulfuric depending on the type of dissolved solids present in water.
- **Health Purposes:** Water with high TDS is completely safe to drink. However, some substances such as lead, or copper can lead to health hazards.
- **Maintenance of Filters:** Water filtration systems are affected by a high level of TDS. Testing the water purifier systems regularly will ensure that the filters work properly
- **Cooking:** Though high TDS doesn't affect health, it can alter the taste of your food.
- **Cleaning:** High TDS in water leaves ugly spots on your utensils. This type also fades the color of your clothes, leading to a buildup in your sinks, tubs, and faucets.
- **Plumbing and Appliances:** High amounts of dissolved calcium and magnesium salts can cause scale to form in pipes and appliances, reducing their lifespan. The above are the reasons to measure total dissolved solids in water.

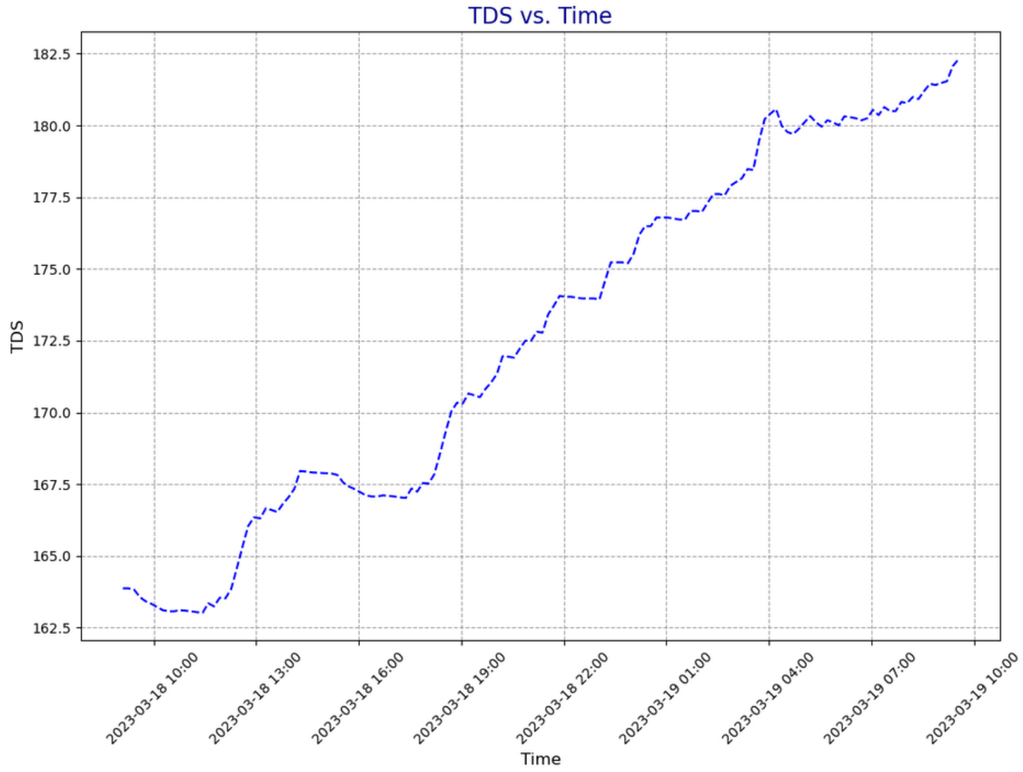
TDS LEVEL CHART FOR DRINKING WATER

TDS Level in parts per million(ppm)	Palatability Quotient
Between 50-150	Excellent for drinking
150-250	Good
250-300	Fair
300-500	Poor
Above 1200	Unacceptable

BAKUL


TDS vs. Time
TDS
Time
300
320
340
360
380
2023-03-22 13:00
2023-03-22 16:00
2023-03-22 19:00
2023-03-22 22:00
2023-03-23 01:00
2023-03-23 04:00
2023-03-23 07:00
2023-03-23 10:00
2023-03-23 13:00
2023-03-23 16:00
2023-03-23 19:00
2023-03-23 22:00
2023-03-24 01:00
2023-03-24 04:00
2023-03-24 07:00
2023-03-24 10:00
2023-03-24 13:00
2023-03-24 16:00
2023-03-24 19:00
2023-03-24 22:00
2023-03-25 01:00
2023-03-25 04:00
2023-03-25 07:00
2023-03-25 10:00
2023-03-25 13:00
2023-03-25 16:00
2023-03-25 19:00
2023-03-25 22:00
2023-03-26 01:00
2023-03-26 04:00
2023-03-26 07:00
2023-03-26 10:00

OBH


TDS vs. Time
TDS
Time
162.5
165.0
167.5
170.0
172.5
175.0
177.5
180.0
182.5
2023-03-18 10:00
2023-03-18 13:00
2023-03-18 16:00
2023-03-18 19:00
2023-03-18 22:00
2023-03-19 01:00
2023-03-19 04:00
2023-03-19 07:00
2023-03-19 10:00

pH OF WATER

- The pH value of a water source is a measure of its acidity or alkalinity.
- The pH level is a measurement of the activity of the hydrogen atom, because the hydrogen activity is a good representation of the acidity or alkalinity of water.
- The EDA agency recommends that municipal drinking water suppliers keep their water supply at a pH of 6.5 to 8.5.
- The pH of water can affect its taste, odor, and color, making it less appealing for human consumption.
- Additionally, pH can affect the solubility of contaminants in water, making some chemicals more harmful at certain pH levels

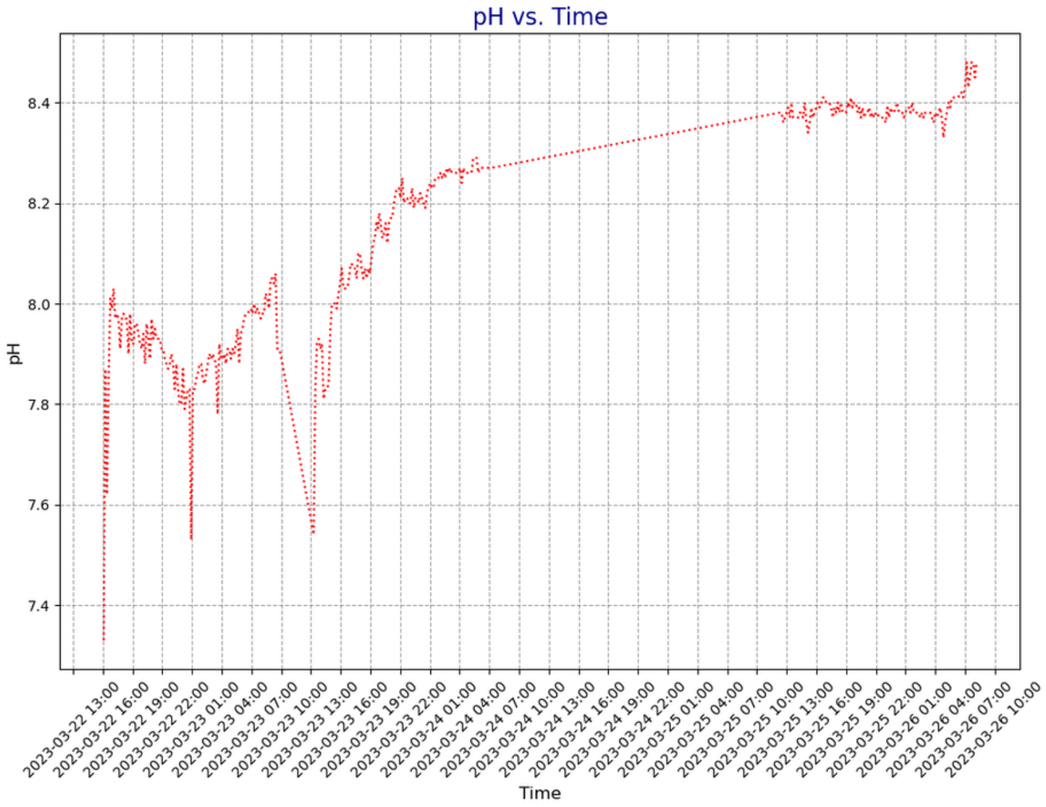
pH LEVEL CHART

Type of water	pH level
Tap water	Varies; typically about 7.5
Distilled reverse osmosis water	5 to 7
Common bottled waters	6.5 to 7.5
Bottled waters labeled as alkaline	8 to 9
Ocean water	About 8
Acid rain	5 to 5.5

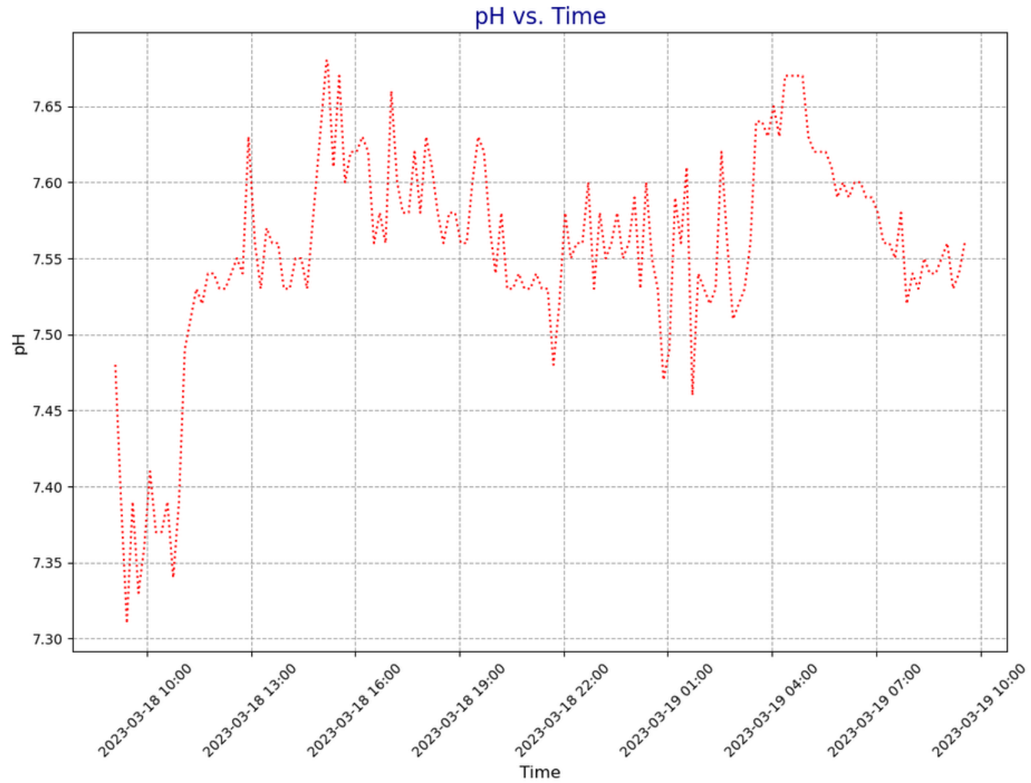
pH OF WATER

- **Skin Sensitivity:** Bathing in water with a high pH (typically above 8.5) can dry out your skin and hair, as it can strip away natural oils. This can lead to irritation, especially for those with sensitive skin or skin conditions such as eczema.
- **Eye Irritation:** High pH water can irritate your eyes if it splashes into them during bathing.
- **Skin Irritation:** Bathing in water with a low pH (typically below 6.5) can cause skin irritation, particularly for people with sensitive skin. Acidic water may strip away natural oils, leading to dryness, itching, or redness.
- **Hair Damage:** Acidic water may also affect hair, potentially making it more brittle or prone to damage.
- Drinking water with a low pH can lead to health concerns, especially if the water contains dissolved metals from corroded plumbing. The acidity itself can potentially irritate the digestive system, although the body usually neutralizes acidic water quickly.

BAKUL


pH vs. Time
pH
8.4
8.2
8.0
7.8
7.6
7.4
Time
2023-03-22 13:00
2023-03-22 16:00
2023-03-22 19:00
2023-03-22 22:00
2023-03-23 01:00
2023-03-23 04:00
2023-03-23 07:00
2023-03-23 10:00
2023-03-23 13:00
2023-03-23 16:00
2023-03-23 19:00
2023-03-23 22:00
2023-03-24 01:00
2023-03-24 04:00
2023-03-24 07:00
2023-03-24 10:00
2023-03-24 13:00
2023-03-24 16:00
2023-03-24 19:00
2023-03-24 22:00
2023-03-25 01:00
2023-03-25 04:00
2023-03-25 07:00
2023-03-25 10:00
2023-03-25 13:00
2023-03-25 16:00
2023-03-25 19:00
2023-03-25 22:00
2023-03-26 01:00
2023-03-26 04:00
2023-03-26 07:00
2023-03-26 10:00

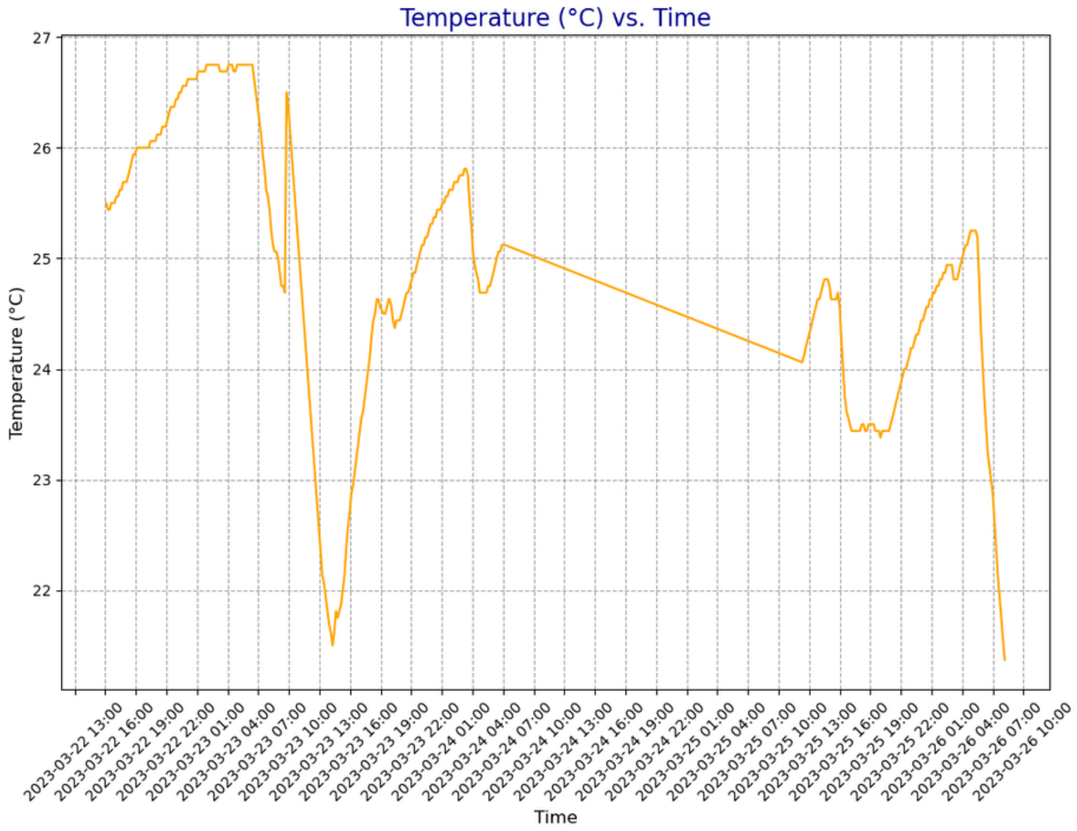
OBH


pH vs. Time
pH
7.65
7.60
7.55
7.50
7.45
7.40
7.35
7.30
Time
2023-03-18 10:00
2023-03-18 13:00
2023-03-18 16:00
2023-03-18 19:00
2023-03-18 22:00
2023-03-19 01:00
2023-03-19 04:00
2023-03-19 07:00
2023-03-19 10:00

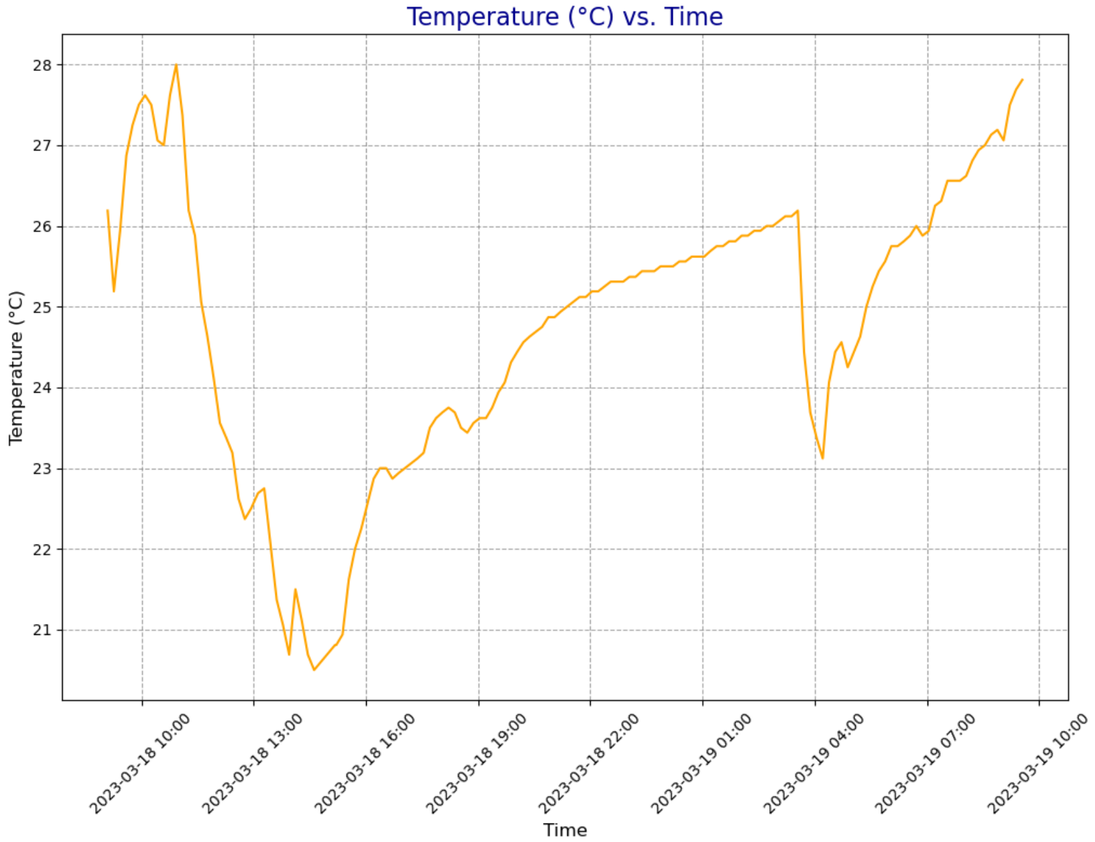
TEMPERATURE

- The ideal temperature for drinking water is typically between 50°F and 70°F (10°C to 21°C).
- Water stored at a cool temperature can help inhibit the growth of harmful bacteria.
- Warm water can help soothe muscles and relieve tension, while cooler water can invigorate and energize the body.
- It's important to consider the temperature of water in various aspects of daily life to maximize its benefits for health and comfort.

BAKUL


Temperature (°C) vs. Time
Temperature (°C)
Time

OBH


Temperature (°C) vs. Time
Temperature (°C)
Time

ANALYSIS

- **TDS:**
  - The TDS value in Bakul's water ranges from 300-400 ppm, which is relatively higher compared to OBH's range of 160-180 ppm.
  - Higher TDS levels may indicate the presence of minerals and salts, which can affect the taste and hardness of the water.
  - OBH's water has lower TDS, suggesting it may have a purer taste and softer texture.

- **pH Values:**
  - The pH value in Bakul's water ranges from 7.2-8.6, which suggests that the water can be neutral to slightly alkaline.
  - In contrast, OBH's water has a narrower pH range of 7.3-7.7, indicating that it is closer to neutral and potentially more stable.

- **Temperature:**
  - The temperature of water in Bakul ranges from 21-27°C, while in OBH, it ranges from 20-28°C.
  - Both ranges are within the typical temperature range of ambient water and are fairly similar.

CONCLUSION

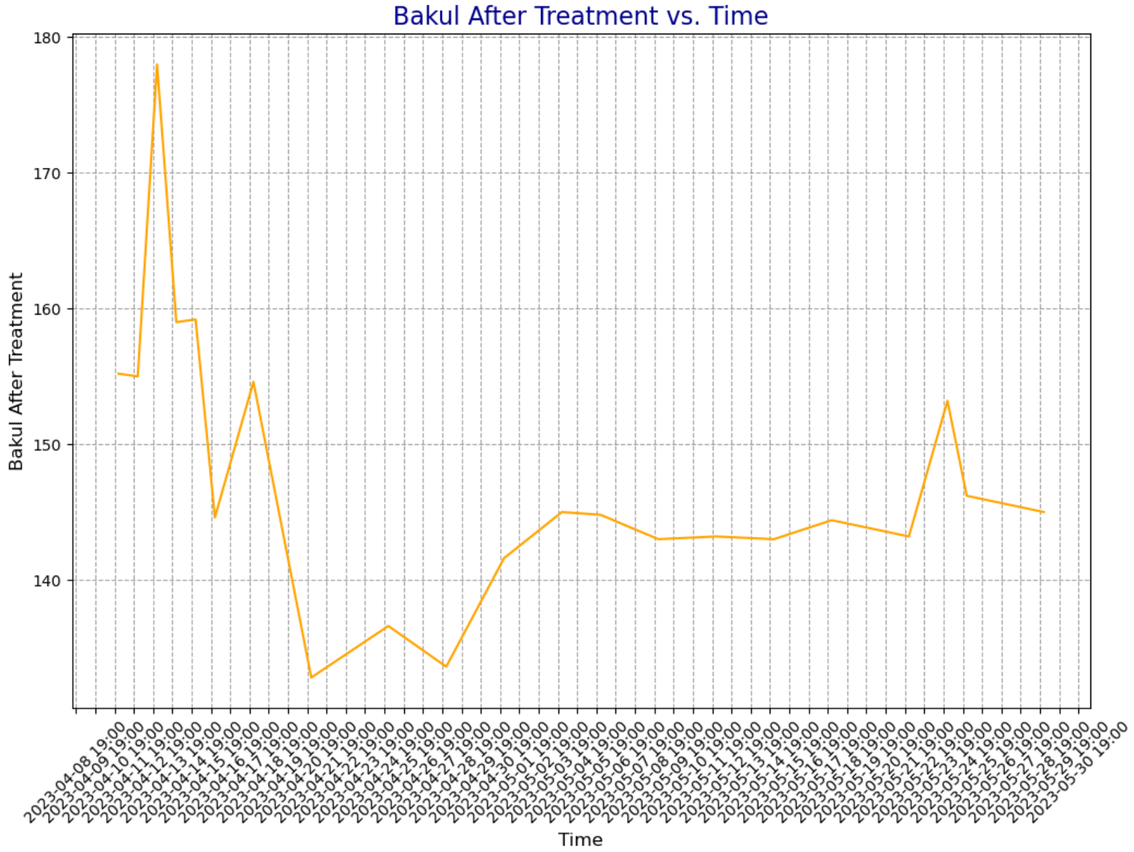
- **Quality:** Overall, OBH's water appears to have better quality in terms of lower TDS and a more stable, neutral pH range, which is preferable for drinking water. Bakul's water has higher TDS and a wider pH range, which may make it less suitable for consumption or require more filtration and treatment.

- **Usage:** Depending on the end use, the water from Bakul may need more treatment to reduce TDS and adjust pH for drinking purposes. OBH's water, with its lower TDS and neutral pH, is likely more suitable for direct consumption.

- **Temperature:** The water temperatures from both sources are within a typical range and do not seem to present any significant concerns for health or usage.

TDS After treatment

BAKUL



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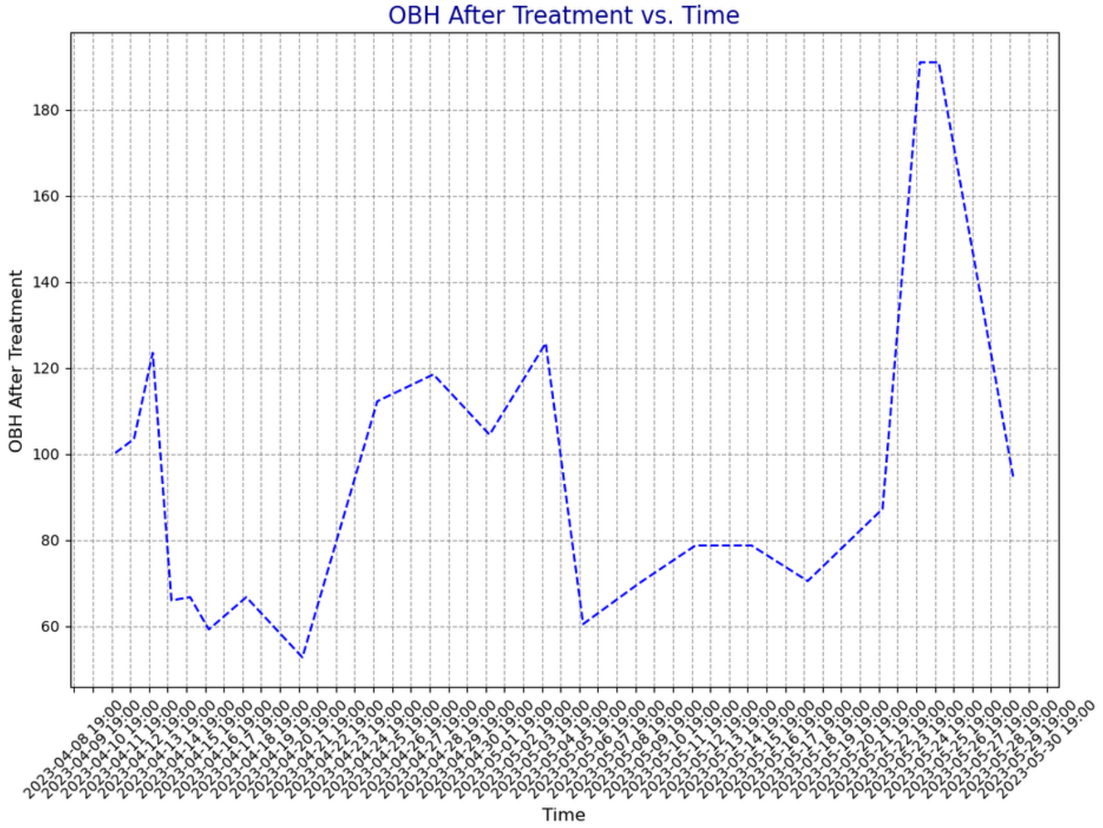
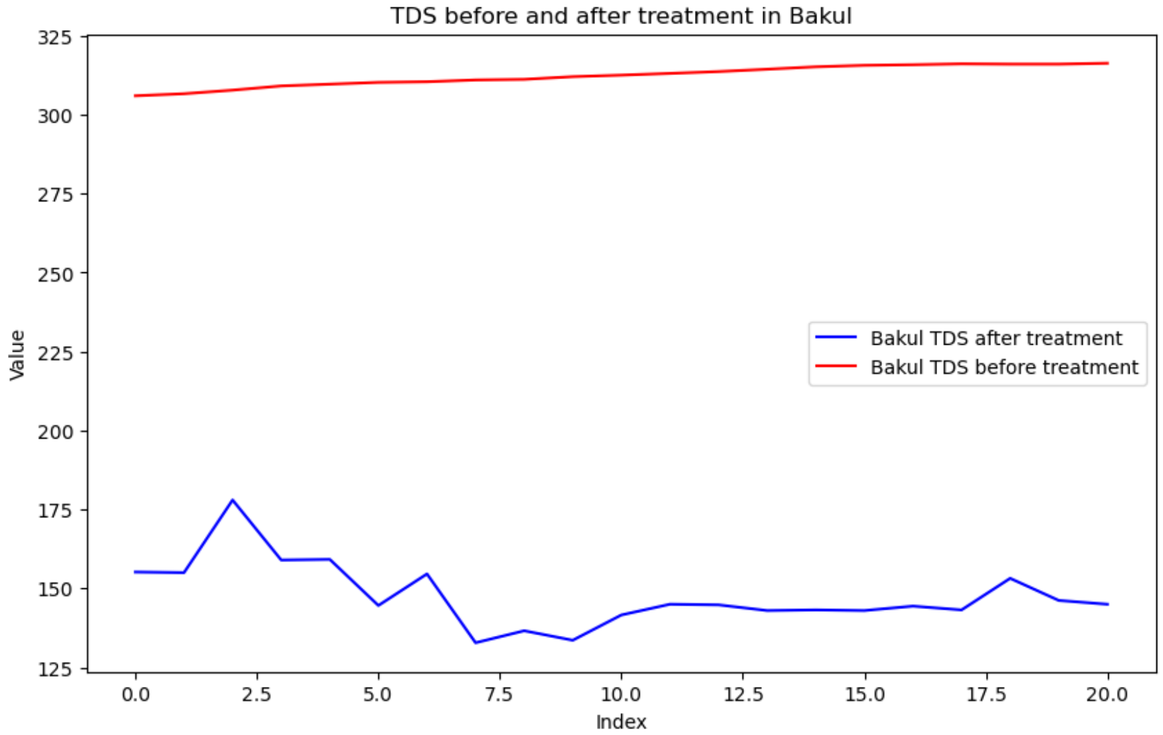
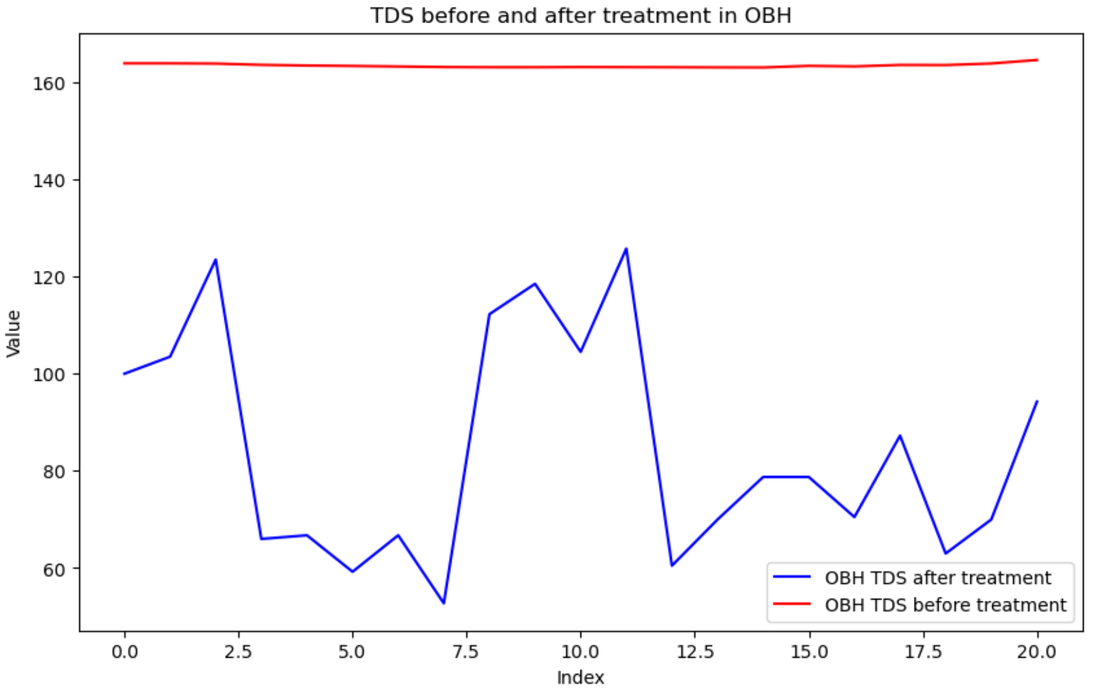


BAKUL


TDS before and after treatment in Bakul
Value
Index
Bakul TDS after treatment
Bakul TDS before treatment
325
300
275
250
225
200
175
150
125
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0

OBH


TDS before and after treatment in OBH
Value
Index
OBH TDS after treatment
OBH TDS before treatment
160
140
120
100
80
60
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0

MEASURES TO BE TAKEN

- Cholorination of all OHTs (Overhead tanks) in the hostels should be done regularly.
- Disinfection with Chloramine (monochloramine).

- Replacement of the RO (Reverse Osmosis) filters in all hostels regularly.

- All the water coolers need to be cleaned frequently (like twice in a week).

- Water Testing needs to be done frequently.

- Insulate hot water pipes to help maintain consistent water temperature and reduce energy consumption.

MEASURES TO BE TAKEN

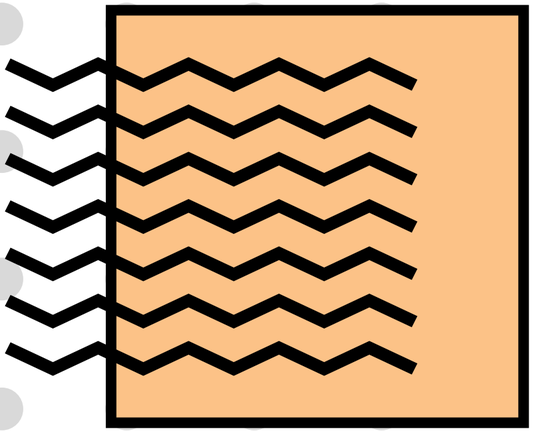
Smart Home Water Devices

Real-time TDS Monitoring Bot for Clean and Safe Water

Digital pH meters

REFERENCES

- https://pingiiit.org/water-mess/
- https://www.safewater.org/fact-sheets-1/2017/1/23/tds-and-ph
- https://www.healthline.com/health/ph-of-drinking-water
- https://www.safewater.org/fact-sheets-1/2018/8/15/water-temperature-fact-sheet



THANKS FOR WATCHING