Chittagong University of Engineering and Technology

Department of Civil Engineering

Project Title: **Water Quality Test of Specified Location**
Location: **Shah Amanat Bridge, Chittagong**

Course No: **CE-352**

Course Name: **ENVIRONMENTAL ENGINEERING(Sessional-I)**

Course Instructor:

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Introduction

This report documents the findings and analysis of the Surface Water sample collected from the Shah Amanat Bridge area in Chittagong, as part of our Environmental Engineering (Sessional-1) (CE-352) course. The purpose of this study was to understand the quality of the Surface water in the area and assess its compliance with local and international standards and guidelines, particularly those set by The Environment Conservation Rules, 1997 and the World Health Organization (WHO).

Objectives of the Project

- Assess the quality of Surface water near Shah Amanat Bridge in Chittagong.
- Determine compliance with the Environmental Conservation Rules-1997 (ECR) and WHO guidelines.
- Identify potential contaminants and risks in the collected water samples.
- Conduct a range of experiments to measure key water quality parameters.
- Gain practical experience in sample collection, testing, and analysis techniques.
- Apply the acquired knowledge to real-life environmental conservation and water resource management scenarios.

Location of the site

Appointed Location: Shah Amanat Bridge, Chittagong

Specific Location: Riverbank of Karnaphuli River near the Shah Amanat Bridge, Chittagong

Outline of The Project

Significance & List of Tests

Sources of Water	Physical characteristics	Chemical characteristics	Bacteriological characteristics
Surface Water	Bad	Good	Bad
Ground Water	Good	Bad	Good

Surface water usually meets the required chemical composition standards for various water uses, including drinking water supply, irrigation, and industrial processes. However, untreated, or poorly treated wastewater from municipal sources, as well as inadequately treated industrial effluents, can introduce a wide range of contaminants into the river. Additionally, runoff from agricultural fields may carry pesticides, fertilizers, and sediment into the river. To ensure water quality and identify potential contaminants, it is crucial to conduct various laboratory tests.

For the water sample taken from the Karnaphuli River, the following physical and chemical tests were completed:

Physical Tests:

- Turbidity: to measure the presence of suspended solids.

- Color: to indicate the presence of organic matter.

- Temperature: to assess its impact on aquatic life.

Chemical Tests:

- pH: to measure acidity or alkalinity, which affects water chemistry and aquatic life.

- Dissolved Oxygen (DO): to determine the amount of oxygen dissolved in the water, crucial for aquatic organisms.

- Total Dissolved Solids (TDS), Total Suspended Solids (TSS), and Total Solids (TS): to measure the concentration of dissolved inorganic and organic substances as well as suspended solids in the water.

- Acidity: to measure the concentration of acidic substances (e.g., hydrogen ions) in the water.

- Alkalinity: to measure the water's capacity to resist pH changes caused by the addition of acids.

- Hardness: to measure the water's ability to resist pH changes and its impact on soap efficiency.

- Chloride: to measure the water's chloride content, which affects pH levels.

In our water sample collection from the river, our primary focus is on assessing key parameters crucial for the well-being of aquatic life and environmental health, such as BOD (Biochemical Oxygen Demand), temperature, and pH.

By conducting these tests, we can obtain a comprehensive assessment of the water quality in the Karnaphuli River, enabling informed decision-making for water management and the protection of human health and the environment in the area.

Result Summery & Comparison with Drinking Water Standards & Guideline Values

Experiment No	Experiment Name	Result	Standard Value (ECR-1997)	Guideline Value (WHO)
1.	Color	190 PCU	≤15 PCU	≤15 PCU
2.	Turbidity	160 NTU	≤10 NTU	≤5 NTU
3.	pH	6.75	6.50 – 8.50	6.5–8.5
4.	BOD	3.2 mg/L	0.2 mg/L	
5.	Total Dissolved Solids (TDS), Total Suspended Solids (TSS), and Total Solids (TS)	TDS = 430 mg/L TS = 770 mg/L TSS = 340 mg/L	TDS≤1000 mg/L TSS≤10 mg/L	TDS≤1000 mg/L
6.	Acidity	6.5 mg/L as $CaCO_3$	No Standard Value	No Guideline Value
7.	Alkalinity	80 mg/L	No Standard Value	No Guideline Value
8.	Hardness	14.2 mg/L as $CaCO_3$	200-500 as $CaCO_3$	
9.	Chloride	160.176 mg/L as CaCO3	150-600 mg/L as CaCO3	250 mg/L as CaCO3
10.	Iron	0.4 mg/L	0.3 - 1.0 mg/L	0.3 mg/L
11.	TC, FC	0 mg/L	0 mg/L	0 mg/L

Analysis of the Results

1. Color:

- Color: 190 PCU.

- Reasons for high color:

  - Presence a high amount of turbidity.
  - Excess amount of chemical and biological organisms.

2. Turbidity:

- Turbidity value: 160 NTU.

- Higher turbidity due to increased scattering of light caused by suspended solids, including inorganic and organic matter, algae, clay, silt, dissolved organic compounds, and plankton.

3. pH:

- pH value: 6.75 (slightly acidic).

- Industrial effluents, organic matter decomposition, and manufacturing activities may contribute to the acidity.

- pH falls within the acceptable range for drinking water (6.5 to 8.5) but might not be suitable for sensitive aquatic ecosystems.

4. Total Dissolved Solids (TDS):

- TDS value: 430 mg/L.

- Industrial discharges and agricultural runoff contribute to dissolved ions, salts, and fertilizers, increasing TDS levels.

5. Total Solids (TS):

- TS value: 770 mg/L.

- Represents the total solid content, including dissolved and suspended solids.

6. Total Suspended Solids (TSS):

- TSS value: 340 mg/L.

- Indicates the concentration of suspended particles in water, contributing to turbidity.

7. Acidity (CO2):

- CO2 concentration: 6.5 mg/L.

- Water is well-aerated, with no concerns regarding CO2 concentration.

8. Alkalinity:

- Alkalinity value: 80 mg/L as CaCO3.

- Within the acceptable range for drinkability according to BECR (1997), subject to potential changes depending on pollution and season.

9. Hardness:

- Hardness value: 14.2 mg/L as CaCO3.

- Water is moderately hard, containing elevated levels of calcium and magnesium ions.

10. Chloride:

- Chloride ion concentration: 160.176 mg/L.

- Within internationally accepted limits (less than 250 mg/L) but influenced by nearby industries and seasonal variations.

- Iron concentration: Within the BECR (1997) standard range of .3-1 mg/L for drinking water.

- No need for iron filtration, but iron levels may vary seasonally.

12. Electrical Conductivity (EC):

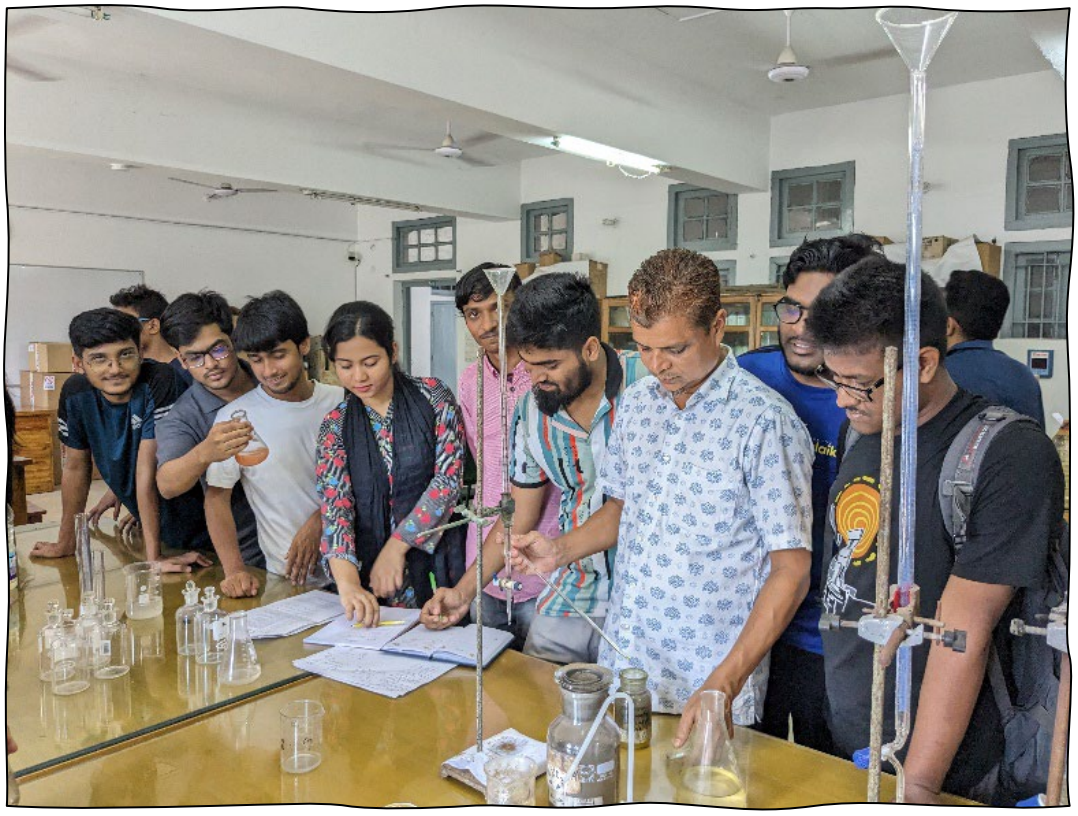
- EC value: 660 µS/cm.

- Presence of dissolved ions and salts in the water, suggesting increased salinity, which may pose challenges for certain applications.

13. TC, FC:

-TC, FC value: 0 mg/l means no bacteria, E. coli present in our water sample.

Photo Gallery



Group Snapshot at Environment Lab



Group Snapshot at Sample Collection area



Group Snapshot at Sample Collection area.

The End