Test Project

Task B1 – Alkalinity determination by Titration

Water Technology

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Introduction

Alkalinity is a measure of the capacity of water to neutralize acids or resist changes that cause acidity. It is one of the important water quality parameters that affect aquatic life and drinking water/wastewater treatment. One of the methods to determine alkalinity is by titrating the solution with an acid such as hydrochloric acid (HCl) until its pH changes abruptly, or it reaches a known endpoint. The objective of this task is to follow the titration procedure to determine the alkalinity of the water.

Description of project and tasks

Your task:

1. Prepare required amount of less concentrated standard solution of hydrochloric acid (HCl) from a stock solution for titration.
2. Perform titration to determine alkalinity for different water samples.
3. Calculate alkalinity concentration of water samples.
4. Document the results.

Lab coat, gloves, and safety glasses are required for this task.

Instructions to the Competitor

Standard solution preparation

1. Prepare required amount (e.g., at least 100 ml) standard solution of an appropriate concentration, e.g., 0.1N hydrochloric acid (HCl) from a stock solution of 0.5N or 1.0N HCl.

Titration Procedure

1. Set up burette onto metal stand.
2. Rinse burette with titrant.
3. Fill burette with titrant and set the volume preferably at zero point.
4. Provide mixing to water sample and transfer 100 mL to Erlenmeyer flask by volumetric pipette.
5. Prepare a reference colour for end point comparison.

- Transfer 100 mL of distilled water into an Erlenmeyer flask.
- Add 1 – 2 mL of titrant as well as a few drops of phenolphthalein indicator.

6. Add in a few drops of phenolphthalein indicator to the water sample before titration starts.
7. Slowly drip the titrant into the sample while swirling the flask till the end point of colour change is observed.
8. Record down titrant consumption volume in your report.
9. Calculate alkalinity of the water sample.
10. Repeat earlier steps for other water samples.

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Calculation

Alkalinity concentration:

$$C = \frac{\mathrm{Vt\ x\ N\ x\ 50000}}{\mathrm{Vs}}$$

C: Alkalinity concentration (mg/L)

V_t: Titrated volume (mL)

N: Normality of standard acid solution

V_s: sample volume (mL)

To continue.

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Tables, Graphs and Pictures

B1 – Alkalinity Determination by Titration

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Data and Report

Country Name: _____ **Competitor Name:** _____

Table 1: Test results of alkalinity determination.

SAMPLE	TITRATED VOLUME (ML)	ALKALINITY (MG/L)
A		
B		
C		
D		
E		

Table 2: Resource sustainability and waste generation.

ITEM	QUANTITY
Quantity of pipette tips used (Pieces) (Inclusive of all tips, e.g., 1mL and 5 mL tips)	

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Table 3: Time Used for the Task.

TIME	TIME CHECK
End time (hh / mm)	
Duration (min)	
Checked by	Expert Signature / Name

Marking Scheme

The task evaluation will be made according to the Competition Information System (CIS) of Water Technology 2026.

End.