KINETICS OF CHEMICAL OXYGEN DEMAND (COD) REMOVAL OF ANAEROBIC BAFFLE REACTOR AT WASTEWATER TREATMENT PLANT AT KATHMANDU UNIVERSITY

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INTRODUCTION

- Wastewater treatment is a emerging issue in urban areas, mostly in developing countries like Nepal, effective management of wastewater is essential for preserving environmental quality and public health;
- Institution are one of the major sources of wastewater and faces significant challenges due to inadequate wastewater infrastructure, limited human resource and financial constraints
- Development of appropriate wastewater treatment plant to overcome the above challenges is the major need
- The study assessed the Kinetics of COD removal of ABR at Kathmandu University and propose the potential improvements to enhanced sustainability of ABR;
- Wastewater treatment plants play a crucial role in safeguarding the environment by mitigating the impact of pollutants discharged into natural water bodies;
- Among the various parameters used to assess the effectiveness of wastewater treatment processes, Chemical Oxygen Demand (COD) stands out as a critical indicator of organic pollution;

OBJECTIVES

- To quantify the kinetics of COD removal in anaerobic baffle reactors (ABRs) at the wastewater treatment plant (WWTP) by conducting experimental analyses over a specified period at Kathmandu University.
- To determine the kinetic models first-order and second-order to analyze experimental data and describe the relationship between COD concentration and removal rates in ABR systems.
- To determine the removal efficiency of Kathmandu University wastewater treatment Plant in terms of each treatment unit.

MATERIALS AND METHODS

University's (east wing) estimated wastewater discharge is 60 m^3/d

District : Kavrepalanchok

Location : Dhulikhel Municipality, Bagmati Province

Description	Calculation	Total Samples
Total number of samples per day	10 sampling points x 1 sampling times/day	10 samples
Total number of samples per week	10 samples x 3 days/week	30 samples
Total number of samples for the study (4 weeks)	30 samples x 7 weeks	210 samples

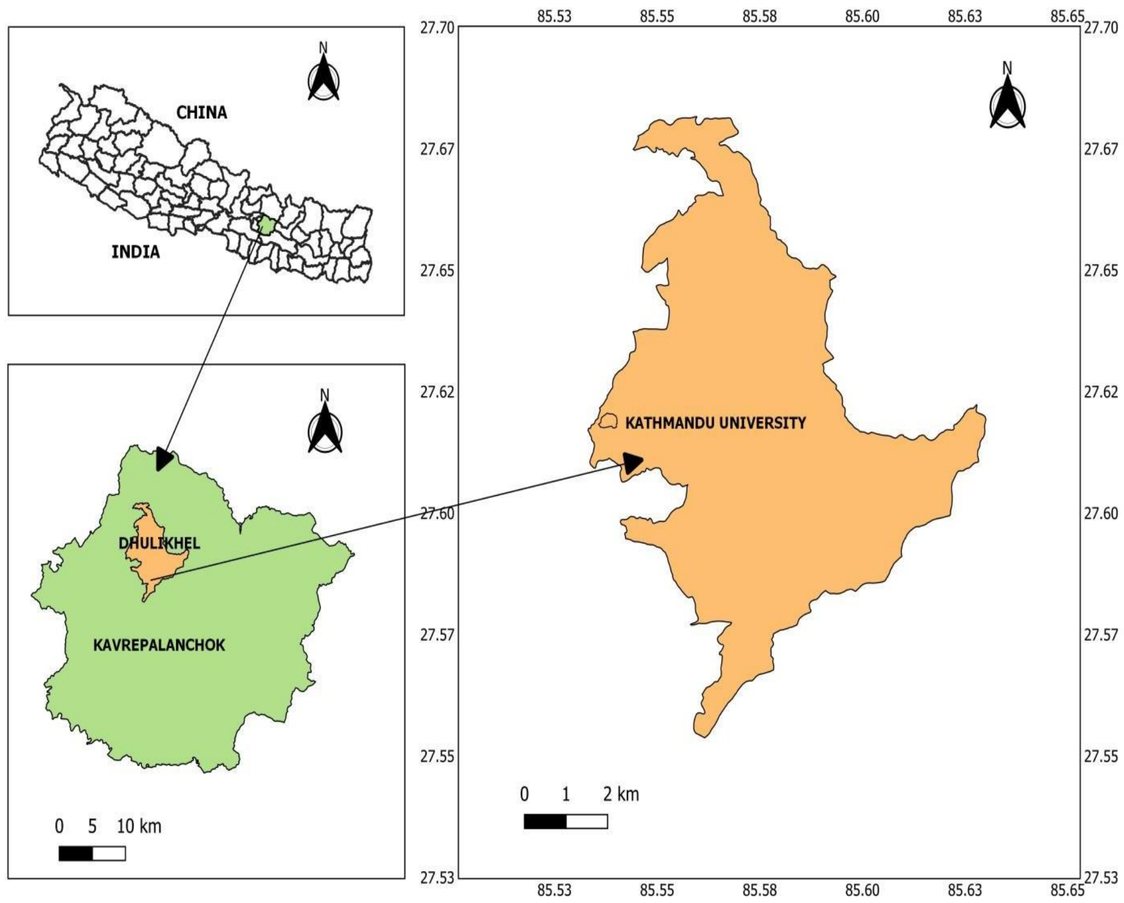

Figure 1: Location of Kathmandu University Wastewater Treatment Plant

RESULTS

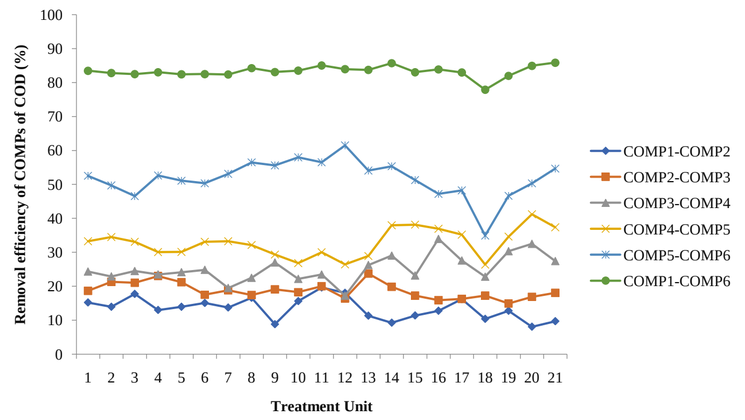

Figure 2: Average removal efficiency of COD (%) in different treatment unit of ABR

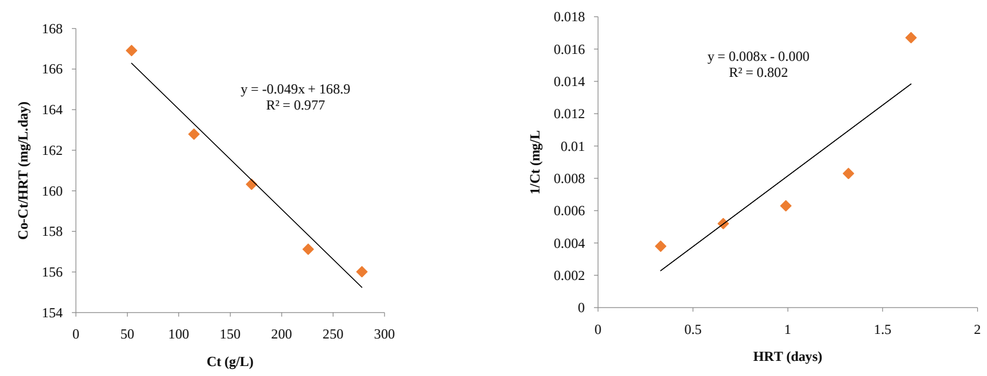

Figure 3: First and Second-order from COD kinetics in ABRs treatments at differences of COD

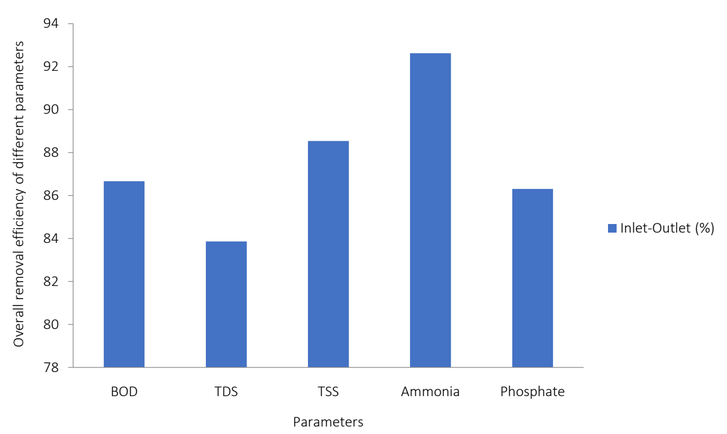

Figure 4: Overall Removal efficiencies of different parameters

CONCLUSION

- COD at the first- and second-order kinetics with high regression coefficients (R^2 values) of 0.977 and 0.802, respectively.
- The first-order regression model, with an R^2 value of 0.977, provides a better fit compared to the second-order model.
- Treated wastewater meets standards for pH, Temperature, COD, BOD, TDS, Ammonia, and Phosphate.

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