

**Performance evaluation and Design analysis of the Sewage  
Treatment Plant based on the Anaerobic Baffled reactor**

**A Dissertation**

*Submitted in partial fulfilment of the requirement*

*for the award of the degree of*

**Masters of Technology**

In

**Environmental Science and Technology**

Submitted

By

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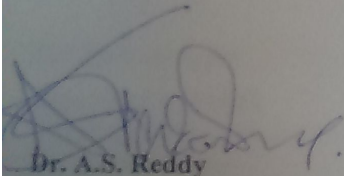


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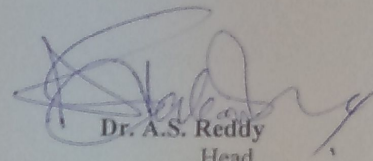
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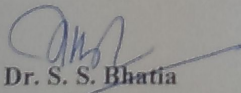
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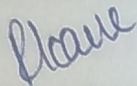
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## **Declaration**

I, the undersigned, hereby declare that the research work presented in the dissertation entitled **“Performance evaluation and design analysis of the Sewage Treatment Plant based on the Anaerobic Baffled Reactor”** has been carried out by me under the supervision and guidance of **Dr. A.S. Reddy, Associate Professor, School of Energy and Environment, Thapar University, Patiala**. Further I declare that no part of this dissertation has been submitted for a degree or any other qualification of any other university or examining body in India/elsewhere.



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**Ramandeep Kaur**

## **Abstract**

Anaerobic processes for wastewater treatment have attracted increased attention, having noteworthy advantages over the established aerobic treatment processes like ASP. They are simple in design, have lower capital and operating cost, and have shown higher treatment efficiencies with lower excess sludge production. UASB reactors have been extensively used for the domestic wastewater treatment, especially in the tropical countries. ABR, a simplification of the UASB reactor has also been extensively studied for its potential for wastewater treatment since the last three decades, and it can be effectively used for domestic as well as industrial wastewater treatment in developing nations, offering the merit of higher efficiency at a low cost. The effluents of anaerobic reactors, like the ABR however don't meet the respective effluent discharge standards and need a post treatment facility like the polishing pond.

The work enclosed is centred around the sewage treatment plant based on the ABR. The facultative pond followed by a multistage roughing filter is used as the post treatment to the primary treated effluent. The sewage parameters were studied and used to analyze the performance of the STP. The COD, BOD and TSS removal efficiencies were found to be 71.6%, 67.08% and 76.74%. The total coliform removal efficiency was found to be 89.87%. The sewage treatment plants are designed using empirical equations derived from the study of existing treatment plants or the pilot scale plants. Thus the actual performance may vary from the design, due to change in local environmental conditions and the sewage characteristics. Therefore the design analysis was performed to validate the equations given in literature and devise new equations for the existing conditions.

**Keywords:** ABR; Facultative pond; COD; BOD; TSS; Coliform.

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## **List of Abbreviations**

STP	Sewage Treatment Plant
UASB	Upflow Anaerobic Sludge Blanket
ABR	Anaerobic Baffled Reactor
WSP	Waste Stabilization Pond
FP	Facultative Pond
HRF	Horizontal Roughing Filter
CSTR	Continuous Stirred Tank Reactor
HRT	Hydraulic Retention time
SRT	Sludge Retention Time
OLR	Organic Loading Rate
COD	Chemical Oxygen Demand
BOD	Biological Oxygen Demand
DO	Dissolved Oxygen
TSS	Total Suspended Solids
TDS	Total Dissolved Solids
TKN	Total Kjeldahl Nitrogen
VFA	Volatile Fatty Acid
MPN	Most Probable Number