



OPTIMIZATION OF PHOSPHORUS REMOVAL IN EBPR WASTEWATER SYSTEM BY EXTERNAL CARBON SOURCE ADDITON

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in Civil Engineering

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by
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Dedication

*This thesis is lovingly dedicated to all the close,
special and beautiful people in my life.*

A special dedication to

my supportive parents

and to

my wonderful family

*and finally
a special dedication to*

my lovely wife

*for encouraging me to complete this work and for
always being there for me.*

STATEMENT

This dissertation is submitted to Ain Shams University, Faculty of Engineering for the degree of M.Sc. in Civil Engineering.

The work included in this thesis was carried out by the author in the department of Public Works, Faculty of Engineering, Ain Shams University, from October 2013 to May 2015.

No part of the thesis has been submitted for a degree or a qualification at any other University or Institution.

The candidate confirms that the work submitted is his own and that appropriate credit has been given where reference has been made to the work of others

Date: - ---/--- /2015

Signature: - -----

Name: - *AHMED ADEL HASSAN ALI SHARAF*

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ABSTRACT

Name : AHMED ADEL HASSAN ALI SHARAF

Title: "OPTIMIZATION OF PHOSPHORUS REMOVAL
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Faculty: Faculty of Engineering, Ain Shams University.

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Abstract:-

The overall goal of this study is to investigate the effect of carbon source (sodium acetate) addition as an application of Enhanced Biological Phosphorous Removal (EBPR) in the modified contact stabilization activated sludge system, by using contact tank as a phosphorus uptake zone and using thickener tank as a phosphorus release zone. The study involved the construction of a pilot plant which was setup in the Quhafa Wastewater Treatment Plant (WWTP), Al-Fayoum, Egypt. Results showed the removal efficiencies of Chemical Oxygen Demand (COD), Biochemical Oxygen Demand (BOD₅) and Total Phosphorus (TP) of this pilot plant were 86%, 85% and 59%, respectively. On the other hand, results showed that sodium acetate addition has decreased the biodegradability of the organic matter by phosphorus accumulating organisms (PAOs) which is represented in the ratio between COD/BOD₅ in the release zone in the thickener as it reached five times. Moreover, addition of sodium acetate caused a turbulence in phosphorus release efficiency in the anaerobic zone where it reached -96%. Finally addition of sodium acetate to the anaerobic zone did not improve the performance of the overall system in general and the release efficiency in particular. In addition, a simple mathematical model for phosphorus release was developed based on a batch test and release rates were measured.

SUPERVISORS

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KEY WORDS

Wastewater treatment, EBPR, contact stabilization, carbon addition, phosphorus release

TABLE OF CONTENTS

	Page
COVER	
APPROVAL COMMITTEE SHEET	ii
DEDICATION	iii
STATEMENT	iv
ACKNOWLEDGMENTS	v
ABSTRACT	vi
TABLE OF CONTENTS	vii
LIST OF FIGURES	vi
LIST OF TABLES	xiv
 CHAPTER (1): INTRODUCTION	 1
1.1. GENERAL.....	1
1.2. OBJECTIVES OF RESEARCH	2
1.3. PLAN OF WORK.....	2
1.4. THESIS ORGANIZATION.....	3
 CHAPTER (2): LITERATURE REVIEW	 4
2.1. INTRODUCTION.....	4
2.2. PHOSPHORUS SOURCES AND ITS STRUCTURE IN MUNICIPAL WASTEWATER.....	4
2.3. BASICS OF PHOSPHORUS SOURCE CONTROL....	6
2.4. PHOSPHORUS COMPOUNDS IN WATER ENVIRONMENT.....	7
2.5. PHOSPHORUS REMOVAL – PROCESS SCHEMES.	7
2.5.1. Groups of Phosphorus Schemes.....	8
2.5.1.1. Chemical phosphorus removal.....	8
2.5.1.2. Biological phosphorus removal.....	9
2.6. CHEMICAL PHOSPHORUS REMOVAL.....	9
2.6.1. Principles of The Process.....	10
2.6.2. Chemicals Applied.....	12
2.6.3. Process Configuration.....	17
2.7. BIOLOGICAL PHOSPHORUS REMOVAL.....	20
2.7.1. Microorganisms Involved in The Process	20
2.8. ENHANCED BIOLOGICAL PHOSPHORUS REMOVAL (EBPR).....	21
2.8.1. Basic Theory.....	21
2.8.2. Process Configurations.....	26
2.9. MAIN FACTORS AFFECTING PERFORMANCE OF BIOLOGICAL PHOSPHORUS REMOVAL.....	33
2.9.1. Anaerobic Conditions.....	33

2.9.2.	Phosphorus Concentration in Secondary Effluent.....	33
2.9.3.	Composition of Incoming Wastewater.....	34
2.9.4.	Availability of Easily Biodegradable Carbon Sources...	34
2.9.5.	Solids Retention Time (SRT).....	36
2.9.6.	Dissolved Oxygen Concentration.....	36
2.9.7.	Temperature.....	37
2.9.8.	pH.....	37
2.10.	EXTERNAL CARBON SOURCE ADDITION.....	38
CHAPTER (3): EXPERIMENTAL WORK.....		40
3.1.	INTRODUCTION.....	40
3.2.	RESEARCH PROJECT LOCATION.....	41
3.3.	OPERATION CONDITIONS.....	42
3.4.	EXPERIMENTAL WORK PLAN.....	42
3.5.	PILOT PLANT DESCRIPTION.....	43
3.5.1.	Contact Tank (Uptake Zone).....	44
3.5.2.	Final Sedimentation Tank.....	45
3.5.3.	Stabilization Tank.....	46
3.5.4.	Thickener (Release Zone).....	47
3.6.	FEEDING SYSTEM ARRANGEMENT.....	48
3.7.	EXPERIMENTAL PROTOCOL.....	50
3.7.1.	First/Startup Stage.....	50
3.7.2.	Second/Core Stage.....	50
3.7.3.	Phosphorus Release Batch Test.....	51
3.8.	DOSING OF CHEMICALS.....	51
3.9.	SAMPLING.....	52
3.10.	MEASUREMENT.....	52
3.10.1.	Total Suspended Solids (TSS) and Volatile Suspended Solids (VSS).....	53
3.10.2.	Chemical Oxygen Demand (COD).....	54
3.10.3.	Biochemical Oxygen Demand (BOD ₅).....	55
3.10.4.	Total Phosphorus (TP).....	55
CHAPTER (4): RESULTS.....		58
4.1.	INTRODUCTION.....	58
4.2.	MEASURED PARAMETERS.....	58
4.3.	FIRST/STARTUP STAGE.....	59
4.3.1.	Influent Wastewater Characteristics.....	59
4.3.2.	Effluent Treated Water Characteristics.....	63
4.3.3.	Characteristics of Mixed Liquor in Contact Tank.....	67
4.3.4.	Thickener Supernatant Characteristics.....	68
4.4.	SECOND/CORE STAGE.....	69
4.4.1.	Influent Wastewater Characteristics.....	70
4.4.2.	Effluent Treated Water Characteristics.....	73

4.4.3.	Characteristics of Mixed Liquor in Contact Tank.....	77
4.4.4.	Thickener Supernatant Characteristics.....	78
4.5.	PHOSPHORUS RELEASE BATCH TEST.....	81
CHAPTER (5): DISCUSSION.....		83
5.1.	INTRODUCTION.....	83
5.2.	OPERATION OF PILOT PLANT.....	83
5.3.	FIRST/STARTUP STAGE.....	84
5.3.1.	Overall System Performance.....	85
5.3.1.1.	Organic matter removal efficiency.....	85
5.3.1.2.	Phosphorus removal efficiency.....	87
5.3.1.3.	Influent and effluent pH.....	89
5.3.2.	Thickener Tank Performance.....	89
5.3.2.1.	pH value (Competence between PAOs and GAOs).....	90
5.3.2.2.	Organic matter uptake efficiency (COD and BOD ₅).....	90
5.3.2.3.	Phosphorus release efficiency.....	90
5.4.	SECOND/CORE STAGE.....	92
5.4.1.	Overall System Performance.....	92
5.4.1.1.	Organic matter removal efficiency.....	92
5.4.1.2.	Phosphorus removal efficiency.....	94
5.4.1.3.	Influent and effluent pH.....	95
5.4.2.	Thickener Tank Performance.....	95
5.4.2.1.	pH value (Competence between PAOs and GAOs).....	96
5.4.2.2.	Organic matter uptake efficiency (COD and BOD ₅).....	96
5.4.2.3.	Phosphorus release efficiency.....	96
5.5.	PHOSPHORUS RELEASE BATCH TEST.....	98
5.5.1.	Mathematical Model of Phosphorus Release.....	99
CHAPTER (6): CONCLUSION AND RECOMMENDATION		101
6.1.	INTRODUCTION.....	101
6.2.	CONCLUSION.....	101
6.3.	RECOMMENDATION.....	102
6.4.	FURTHER WORK.....	102
ANNEX: STARTUP AND COMMISSIONING.....		103
A.1.	INTRODUCTION.....	103
A.2.	UNITS OF PILOT PLANT.....	103
A.3.	ELECTROMECHANICAL WORKS.....	105
A.3.1.	Submersible Pump.....	106
A.3.2.	Air Compressors.....	108
A.3.3.	Sludge Pumps.....	113
A.3.4.	Electric Timers.....	114
A.4.	PIPING SYSTEM.....	114
A.4.1.	Connecting Hose.....	115