

**FEASIBILITY STUDIES ON THE
TREATMENT OF SOME SURFACE WATERS
FOR POTABLE PURPOSES**

PhD DISSERTATION

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ABSTRACT

In Myanmar it is still customary for many people living near the rivers to make use of the water from these rivers for potable purposes. People use these waters directly or by some treatment. These waters are treated by cost effective conventional methods such as sand filtration and coagulation methods especially in some municipalities.

The occurrence of natural organic matter (NOM) in raw drinking water can be problematic for water utilities. NOM influences several processes in drinking water treatment in an unfavourable way. It is also a precursor for haloforms which occur as disinfection by-products (DBPs) after chlorination of drinking water. These haloforms are considered to be carcinogenic. Humic substances, comprising leached soil and aquatic organic materials from vegetative decomposition, make up a large portion of NOM and serve as a major precursor to DBPs formation.

This study was focused on the effectiveness of conventional water treatment methods, sand filtration and coagulation, for removing humic substances and other impurities from surface waters. Seven different surface water samples were studied in this research. Ayeyawady River water, Hlaing River water, and Ngamoeyeik Creek water were investigated. Ayeyawady River water is used as drinking water in several areas. Although Hlaing River water and Ngamoeyeik Creek water have not been used for drinking purposes these are potential sources of drinking water for Yangon City. Three locations in Ayeyawady River, one location in Hlaing River, and three locations in Ngamoeyeik Creek were selected for the study. Among them Ayeyawady River water was found to be of relatively good quality in general.

Water samples were collected and subjected to filtration and coagulation. Glass columns 20 inches long and 1.5 inches in diameter were used for the filtration experiments. Sand, burnt paddy husk, charcoal, and granular activated carbon were used as filter media. Separate layers of filter media were used in some columns and mixed media were used for some columns. Alum and PACl were used for coagulation. Dosages of 20, 40, 60, 80 and 100 mg/L were used in the experiments. Temperature, pH, DO and UV and visible absorbance were mainly measured before and after each treatment. The concentration of humic materials in a natural water is linearly proportional to its absorbance. Humic substances are the major constituents of dissolved organic carbon. Therefore, measurement of absorbance was used as a rapid method and indirect way of measuring the level of dissolved organic materials. Absorbance can be correlated with COD. Also a ratio of absorbance at two wavelengths, 460 and 660 nanometers, called the E4/E6 ratio was determined to study the removal of humic acids and fulvic acid. In order to assess the efficiency of the treatment methods, measurements were conducted many times throughout the research for generalization.

It was observed that sand was the most efficient medium for absorbance removal. Optimum dosage of coagulants varied with water samples. Determination of E4/E6 ratio value provided more information on treatment efficiency. The results indicated that E4/E6 ratio decreases with increase in absorbance removal percent. Removal percent can be predicted with E4/E6 ratio of treated samples. In general, it can be concluded that the conventional water treatment systems can effectively remove the humic substances and other impurities present in river waters.

TABLE OF CONTENTS

			Page
ACKNOWLEDGEMENT		-----	i
ABSTRACT		-----	iii
ABBREVIATIONS		-----	v
TABLE OF CONTENTS		-----	vi
LIST OF TABLES		-----	x
LIST OF FIGURES		-----	xvii
Chapter I	INTRODUCTION	-----	1
1.1	Choice of Source	-----	1
1.2	Choice of Treatment Processes	-----	2
1.3	Objectives of the Present Study	-----	4
Chapter II	THEORY	-----	9
2.1	Water Quality: Definitions, Characteristics, and Perspectives	-----	9
2.1.1	Physical Water-Quality Parameters	-----	9
2.1.1.1	Suspended Solids	-----	9
2.1.1.2	Turbidity	-----	10
2.1.1.3	Color	-----	11
2.1.1.4	Taste and Odor	-----	11
2.1.1.5	Temperature	-----	12
2.1.2	Chemical Water-Quality Parameters	-----	12
2.1.2.1	Total Dissolved Solids	-----	12
2.1.2.2	Alkalinity	-----	13

	Page
2.1.2.3 pH Value	13
2.1.2.4 Electrical Conductivity	14
2.1.2.5 Oxygen	14
2.1.2.6 Hardness	15
2.1.2.7 Metals	15
2.1.2.7.1 Nontoxic Metals	16
2.1.2.7.2 Toxic Metals	16
2.1.2.8 Organics	17
2.1.2.8.1 Biodegradable Organics	17
2.1.2.8.2 Nonbiodegradable Organics	17
2.1.3 Biological Water-Quality Parameters	18
2.1.3.1 Pathogens	18
2.1.3.2 Pathogen Indicators	19
2.2 Treatment of Surface Water	20
2.2.1 Pretreatment	20
2.2.2 Sand Filtration	21
2.2.3 Coagulation	22
2.2.4 Adsorption	23
2.3 Aquatic Humic Substances	25
2.3.1 Amount of Humic Substances in Water	26
2.3.1.1 Groundwater	26
2.3.1.2 Sea Water	27
2.3.1.3 River Water	27
2.3.1.4 Lake Water	28
2.3.1.5 Wetland Water	29

		Page
2.3.2	Characterization by Spectroscopy	30
2.3.2.1	Visible and Ultraviolet Absorbance	30
2.3.3	Structure of Aquatic Humic Substances	32
2.3.3.1	Humic Acid	32
2.3.3.2	Fulvic Acid	33
2.3.4	Humus Formation in Water	35
Chapter III	MATERIALS AND METHODS	37
3.1	Sampling Points	37
3.2	Collection of Water Samples	38
3.3	Analysis of the sample	39
3.4	Pretreatment	39
3.5	Treatment Systems	40
3.5.1	Filtration	40
3.5.2	Coagulation	43
3.5.3	Combined Methods	44
3.5.4	Other Treatment Methods	44
3.6	Acidification	45
Chapter IV	RESULTS AND DISCUSSION	48
4.1	Treatment Systems	119
4.1.1	Filtration	119
4.1.2	Coagulation	121
4.1.3	Overall Results	122

		Page
4.2	Study on the Characteristics of Water -----	134
	CONCLUSIONS -----	141
	SUGGESTIONS FOR FUTURE WORK -----	142
	REFERENCES -----	143
	APPENDIX -----	149
	Appendix – 1 -----	149
	Appendix – 2 -----	157
	Appendix – 3 -----	160
	Appendix – 4 -----	161