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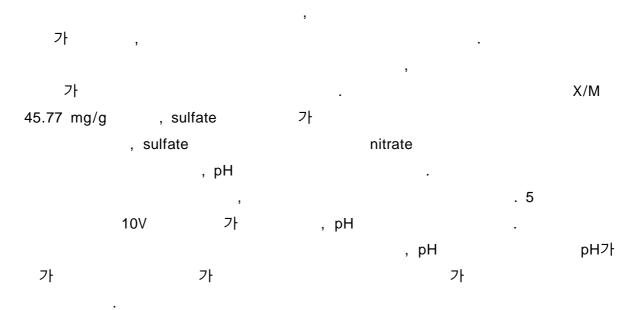
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SUMMARY

I. Title

" Study on the removal of Nitrate Nitrogen and Micro pollutants in the Ground Water "

II. Objectives and Importance

According to the annual report on water supply in 2006, the rate of water supply in Yongin city is 92.5%. It is slightly higher than the rate for Gyeonggi province which has a value of 91.7%. However, the regional discrepancy is very high. The rate of water supply in most rural areas in Yongin reaches under 20%, especially Wonsam down to 6.5%. Since water supply is not sufficient specially in rural areas, people depends mostly on ground water for their drinking water source. The problems are the groundwater pollution by nitrate nitrogen and micro-pollutant for agricultural area. In this regard, it is necessary to carry out a study on the present contamination status and proper maintenance measures to prevent further harm to those involved and secure the sustainable intake of groundwater.

III. Research scope

This research covers the monitoring of the contamination status of groundwater in Yongin city rural areas. In addition, comparison of several treatments such as, membrane separation, ion exchange, and electrodialysis to analyze which is the best method for pollution control. The study will monitor several locations and see the effect of each season to the nitrate nitrogen and other micro pollutants. The treatment methods will be judged on the basis of technical and economical feasibility.

IV. Results

Nitrate nitrogen, the major contaminant in ground water, is limited to 10 mg/L

for drinking water. From 2002 to 2006, nitrate nitrogen has been the major pollutant in ground water being 28.5% of the total contaminants contained in it. Moreover, rural areas are seriously contaminated by nitrate nitrogen. In accordance to drinking water standards, 53 kinds of analysis was performed for Mireukteul and Kubong. For the former, a nitrate nitrogen concentration of 9.7 mg/L and the presence of E. coli was detected. For Kubong, a nitrate nitrogen concentration ranges from 15.9 mg/L to 18.7, indicating a severe nitrate nitrogen contamination. Both areas are not suitable for drinking water consumption. Scanning the vicinity of the areas of concern, several cow farms was found and it was assumed that these are the sources of nitrate nitrogen and E. coli pollutants. A survey of several villages in Wonsam showed that a small water supply and treatment facility is suitable for villages with 60 houses and lower.

A preliminary experiment on nitrate removal using membrane, ion exchange and electrodialysis was performed to understand the basic principles of nitrate treatment. Using ion exchange, it was found out that the ion exchange performance has a value of 45.77 mg nitrate/g resin. In addition, normal ion exchange resin should be used for low sulfate concentration and nitrate ion exchange resins is more favorable for high sulfate concentrations. Nitrate removal is also not affected by pH. For electrodialysis, the speed of nitrate removal is strongly influenced by voltage of operation. It was found out that an operation condition of 5 min run at 10V is the most efficient setting for removal. Nitrate removal is not affected by pH as well. A high pH increases removal rate due to the higher electronegativity of the membranes.

VI. Application plan

Data for nitrate nitrogen and micro pollutants were obtained in rural areas located in Yongin City. The data to verify the technical and economic feasibility will be obtained by performing experiments of each treatment methods. Using these data, the standardized treatment methods will be introduced to small water treatment facilities in the areas concerned.

CONTENTS

Summary (Korean)
Summary (English)
Contents
Chapter 1. Introduction2
1.1 Requirement of research2
Chapter 2. Technology status
2.1 Domestic technology status4
2.2 International technology status6
Chapter 3. Research Performed9
3.1 Objectives and Methods of Research10
3.1.1 Groundwater contamination and proposed treatment process
3.1.2 Analysis of adapted removal technology for treating micro-pollutants 11
Chapter 4. Research Results 12
Chapter 4. Research Results
4.1 Groundwater contamination and proposed treatment process
4.1 Groundwater contamination and proposed treatment process
 4.1 Groundwater contamination and proposed treatment process
 4.1 Groundwater contamination and proposed treatment process
 4.1 Groundwater contamination and proposed treatment process
 4.1 Groundwater contamination and proposed treatment process
 4.1 Groundwater contamination and proposed treatment process
 4.1 Groundwater contamination and proposed treatment process
 4.1 Groundwater contamination and proposed treatment process
 4.1 Groundwater contamination and proposed treatment process

4.3.4 Result comparison85
Chapter 5. Achievements and Contribution
5.1 Expected effect88
5.2 Further research plan and application plan88
Chapter 6. Reference 90
6.1 Reference91
Appendix94
Appendix 195

Appendix 2 ------97

	ONTENTS ···
1	1
2	1.1
•	2
	2.1
6	2.2
	3
10	3.1
10	3.1.1
	3.1.2
12	4
13	4.1
13	4.1.1
,	4.1.2
	4.1.3
	4.1.4
	4.2
	4.2.1
	4.2.2
(, ,)	4.3
65	4.3.1
	4.3.2
	4.3.3
	4.3.4

SUMMARY	(
CONTENT	S	 	 	

5	
5.1	88
5.2	
6	
6.1	

1	 95
2	 97