

▪ “ ”

▪ 2003 , 85.3% 90.3% , 가 80~90% , , 20% 6.5% 가 . , 가 ,

▪ , , (, ,) , .

▪ 10mg/L , 2002 2006 5 28.5% 가 가 9.7 mg/L가 , 53 가 10 mg/L

15.9~18.7 mg/L
 (, ,) , TCE, PCE, 6
 가 .
 , 60가
 . 가 ,
 . ,
 가 X/M
 45.77 mg/g , sulfate 가
 , sulfate nitrate
 , pH .
 , . 5
 10V 가 , pH .
 , pH pH가
 가 가 가 .
 .
 가 ,
 가 , ,
 .

SUMMARY

I. Title

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

II. Objectives and Importance

The rate of water supply in Yong-in city is 85.3% which is lower than the rate for Gyeonggi province which has a value of 90.3%. Moreover, some regions in Yong-in city, specifically, Won-Sam, reaches up to 6.5%. Since water supply, specially in rural areas, are not sufficient, people depend mostly on ground water for drinking. However, using ground water makes them susceptible for nitrate nitrogen and micro pollutants contamination. In this regard, it is inevitable to have a study on the present contamination status and proper controlling measures to prevent further harm to those involved.

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 electro dialysis 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 electro dialysis, 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.

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