CHAPTER I

INTRODUCTION

Nowadays, energy shortage has become one of the most important crisis all over the world. Petroleum as the main source of energy is expected to be exhausted in the near future, so new sources of energy such as wind, water, solar and nuclear have to be developed for replacement. As a consequence, uranium exploration project has been started in almost every country in search for this particular fuel.

In natural, uranium has three isotopes; uranium-234, uranium-235 and uranium-238. ^{235}U is fissile whereas ^{238}U is fertile.

Uranium is widely distributed in many places of the earth's crust. Uranium makes up about 1 to 2 parts per million of the earth's crust. Its average concentration in some typical geological entities is as follows[4] :

	Concentration of U, $\mu g/cm^3$
Low-silica igneous rocks	1
Intermediate igneous rocks	2
High-silica igneous rocks	4
Sedimentary rocks	2
Ground and stream water	0.0002

	Concentration of U, $\mu g/cm^3$
Ocean water	0.002
Petroleum	0.1

The Office of Atomic Energy for Peace acts as a counterpart to the Department of Mineral Resources, Ministry of Industry in the uranium Exploration Project. Geochemical samples and drilled-hole samples are routinely analysed by the well-developed technique of neutron activation. As uranium is very soluble in water, the uranium content in water resources could be used as indicators for further searching of the deposits. The uranium concentration in water is usually very low, i,e., in the order of parts per billion. Thus, specific method has to be developed for accurate and precise analysis of uranium in water.

Neutron activation analysis is a rapid nuclear method which gives high precision and accuracy. By measuring the gamma energy of the radioisotope produced by bombardment with neutrons, the uranium content can be determinded easily.

Ion exchange resin (Dowex 1x8, anion) is especially appropriate for the selective adsorption of trace uranium in acidified water.

In the present study, water samples were irradiated by thermal neutrons and uranium was separated from other interferences by adsorption on anion exchange resin from a

mixture containing EtOH and HCl in the ratio of 4:1. After the separation process, the gamma ray of ^{239}U at 74.5 keV was measured.

The results from the NAA technique were compared with those from the fluorometric method when the fluorescence intensity of uranium was measured after fusion with the flux-mixture containing NaF, Na_2CO_3 and K_2CO_3.