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Hydrogeochemical characteristics of urban groundwater in Seoul

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Numerous studies on urban groundwater have been carried out in many other countries. Urban groundwater shows a unique hydrologic system because of complex urban characteristics such as road pavement, sewers and public water supply systems. These urban facilities may change the characteristics of groundwater recharge but contaminate its quality as well. There have been several researches on urban groundwater in Seoul.

Seoul has been industrialized very rapidly so that the city has large population. The recent population in Seoul amounts to more than ten millions, corresponding to a very high density of about 17,000 people/km^2. Therefore, many factors affect the groundwater quality and quantity in Seoul. Nowadays, groundwater in Seoul is being extracted for construction, industrial use, and drinking and so on. There are 15,714 wells in Seoul and its annual usage is 41,425,977m^3(in 2001). Therefore, systematic studies are needed to properly manage and use the groundwater in Seoul. The purposes of this study in progress are to identify geochemical characteristics of groundwater in Seoul and to determine the extent of groundwater contamination and its relationship with urban characteristics.

For this study, groundwater was sampled from more than 400 preexisting wells that were randomly selected throughout the Seoul area. For all samples, major cations together with Si, Al, Fe, Pb, Hg

For 200 samples among them, TCE, PCE, BTEX were also analyzed by GC.

Our study shows that groundwater types of Seoul are distributed broadly from Ca-HCO_3 type to Ca-Cl+NO_3 type. The latter type indicates anthropogenic contamination. Among cations, Ca is generally high in most samples. In some samples, Na and K are dominant. The dominant anions change widely from HCO_3 to Cl+NO_3. The anion composition is considered to effectively indicate the contribution of distinct anthropogenic sources. In addition, major ions are positively proportional to total dissolved solid (TDS) except K and NO3. Thus, we consider that TDS may be used as an effective indicator of the extent of pollution. However, the increase of TDS may result from increased water-rock interaction. To determine the extent of groundwater contamination, it is needed to figure out the baseline water quality in Seoul. Furthermore, detailed geochemical studies are required to find out pollution sources and their corresponding hydrochemical parameters.

Key words : urban groundwater, Seoul, hydrogeochemistry, anthropogenic pollution