2-4 Integration and Management of Mass Transfer Coefficient in Geological Environment —Development and Operation of Web Site for Diffusion Database (DDB)—

Table 2-1 Main data fields in DDB system

name of field	detail
De	effective diffusion coefficient
De information	boundary condition, condition of solution agitation, etc.
Type	acidic crystalline rock, Basic crystalline rock, Sedimentary rock (sandstone, mudsfone, tuff, etc.)
Element	element name
Species	chemical species
Solid information	place of sample production, type, size of sample disk, shape, pretreatment, mixtures, mineral composition, grain size, isoelectric point, etc.
Dry Density	value of dry density
Porosity	value of porosity
Experimental method	In-diffusion, through diffusion, back to back, etc.
Solution Index	kind of sample solution
Tracer	kind and concentration of tracer
Contact time	sample immersion time for nuclide diffusion in sample
Temperature (C)	temperature of experimental system
Redox condition	Eh (vs SHE), atmosphere condition (anoxic or oxic),
Author	author of source literature
Title, Vol., Num. etc.	title, vol., num., etc. of source literature
publication year	publication year of source literature
Others	other additional information
Quality information	Information concerning quality of data

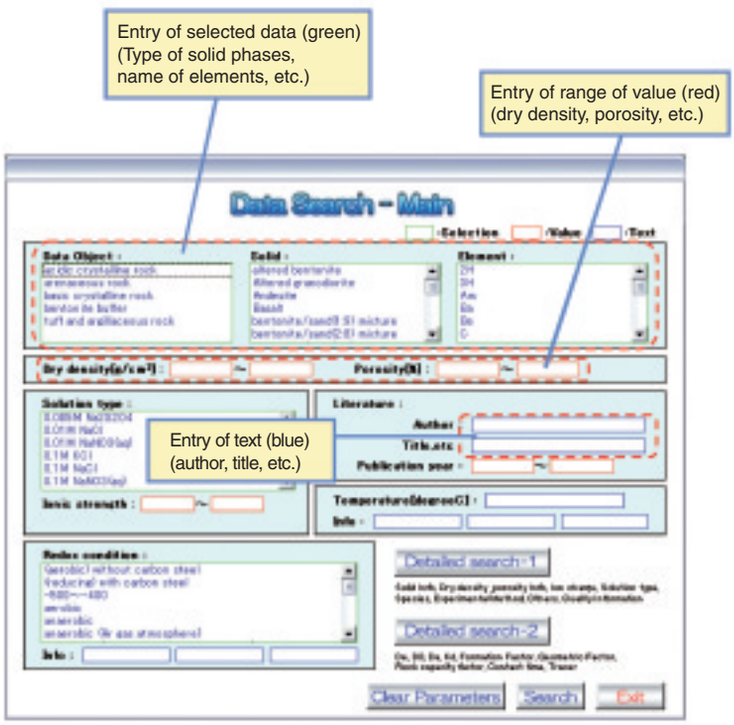

Fig.2-10 Main interface form of data search

We have developed a diffusion database (DDB) to manage and utilize diffusion coefficients and related data. The diffusion coefficient is one of the most important values in investigating the migration behavior of various radionuclides in solid substances. Diffusion data have been collected for their contribution to the safety assessment of geological disposal of radioactive waste. The web site of the DDB has been opened to researchers in similar fields where it has been of valuable use.

The DDB has comprehensive data related to a wide range of diffusion coefficients, e.g. porosity, experimental method, and composition of solution of the sample (refer to Table 2-1), which have been collected by literature survey. The DDB is able to manage and extract the data that a user needs, by setting search conditions. The diffusion database contains information of original literature, so that the user can access detailed information of original sources. The diffusion data managed in DDB are diffusion coefficients of radionuclides in rocks in Japan and related data (about 300) taken from a survey of literature published from 1980 to 1998 to apply for "H12: Project to Establish the Scientific and Technical Basis for HLW Disposal in Japan" (published in 1999).

In order to make the DDB more accessible, the form of the window of data search and display was modified. Through this improvement, search conditions are selected and displayed simultaneously as shown in Fig.2-10.

The DDB is operated by Microsoft-Access, and is accessed through a Web site (URL: http://migrationdb.jaea.go.jp). In order to expand the scope of the DDB, diffusion coefficients of elements in buffer materials and related data for performance assessment of geological disposal have been investigated and compiled. These data will be added to the DDB in the near future.

Reference

Tochigi, Y. et al., Diffusivity Database (DDB) System for Major Rocks and Buffer Materials (Released on 2007/Specification), JAEA-Data/Code 2007-010, 2007, 14p. (in Japanese).