

§2. New Numerical Database for Recombination Cross Sections and Rate Coefficients and Revision of Bibliographic Database System

Murakami, I., Namba, C., Kato, M., Kato, T.

1. New recombination database

We have made a new numerical database for recombination cross sections and rate coefficients by electron impact AMDIS-REC and are now available at the database system through WWW (URL=<http://dbshino.nifs.ac.jp/>).

The recombination database contains theoretical / experimental numerical data of cross sections and rate coefficients for radiative and dielectronic recombination of ions. Data are collected from literatures with help of our collaborators who know better on recombination processes and atomic physics, such as Prof. Ulyana I. Safronova (Univ. of Notre Dame, USA), and from ORNL (Oak Ridge National Laboratory, USA) data collection of Auburn-Rollins-Strathclyde Dielectronic Recombination Project (http://www-cfadc.phy.ornl.gov/data_and_codes/) for ADAS. Continuously we have been collecting data.

Data are categorized into 3 groups: cross sections, rate coefficients with Maxwellian velocity distribution, and Non-Maxwellian rate coefficients. Some experiments with merged beam method, for example, provide rate coefficients in Non-Maxwellian velocity distribution and we need to treat such data separately from rate coefficients in Maxwellian distribution, such as theoretical calculations.

Each data has information on a kind of processes: radiative recombination (RR) or dielectronic recombination (DR), and sometimes like RR+DR.

This database also has formulae of fitting functions and fitting parameters, when the original data are expressed with functions for some theoretical calculations or evaluated data. The information is useful when users use such data for their analysis or modelling.

The retrieval system is similar to other numerical database for ionization (AMDIS-ION) and excitation (AMDIS-EXC) cross sections by electron impact. Users can retrieve data by element, ionic state, initial or final state, as well as author name and published year and need to select data category (cross sections or rate coefficients).

Retrieved data are shown by sorting each process, such as $C^{6+} \rightarrow C^{5+}$ (RR + DR : RC - M) (Maxwellian rate coefficients for combined RR and DR processes). Bibliographic information and numerical data in a table or graphical output are shown. In a graph, data points are plotted with a symbol or connected with a solid line. Graph is displayed in a browser and the postscript file and PDF file are available for downloading.

AMDIS-RECOMBINATION

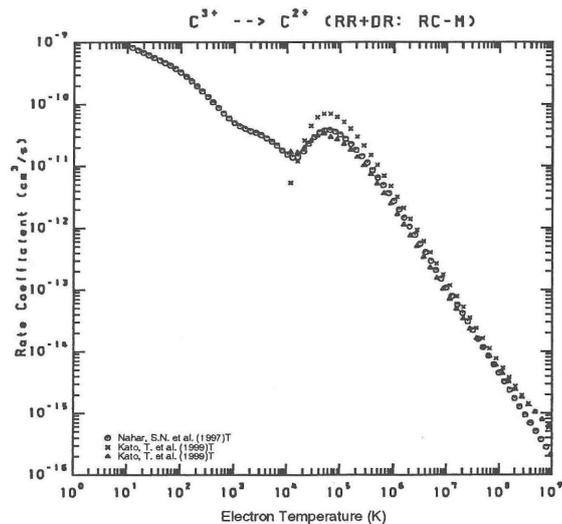


Fig. 1: Example of graphical output for recombination rate coefficients as a function of electron temperature, retrieved from AMDIS-REC database for $C^{3+} \rightarrow C^{2+}$ (RR + DR) process.

2. System revision of bibliographic database

We have revised the retrieval system of bibliographic databases FUSION, AM and PLASMA (data are extracted from INSPEC), which has a simple format for search query and quick and simple return of results. The new retrieval system is appeared as "Rapid search" in the database web page, and the previous one as "Detailed search" since the previous one can be used for complex search query and we also need such system.

Users can search bibliography with author name and/or keywords in the "Rapid search" and the system return query results with author, author affiliation, date of publication, paper title, journal name, volume number, and page number. Then user can go forward to see abstract or all INSPEC data, search our numerical databases, or jump to electric journals when available.

New service of cross search between bibliographic databases and numerical databases and links to electric journals has started with the new "Rapid search" and "Detailed search" supports cross search for numerical database. Access to electric journals is mostly limited for users accessing from NIFS site, since contracts with publishers of journals have such kinds of limitations.

Cross search from the numerical databases to bibliographic database AM and ORNL (bibliography for atomic collision processes compiled by ORNL) is also available for all numerical databases.

These new service and revisions provide better and more useful utilization of the database system for researchers.