

NUCLEAR ASTROPHYSICS WWW SITE

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Progress in many fundamental problems in nuclear astrophysics can be significantly aided by more effectively and more rapidly disseminating nuclear physics research results to the astrophysics research community. Especially needed are nuclear reaction rates put into formats that are easily incorporated into astrophysics models. At ORNL, we are utilizing the latest advances in Internet- and WWW-based information services to disseminate evaluated reaction rates and other crucial nuclear data to the astrophysics research community. We have established a nuclear astrophysics data WWW site for this dissemination work, at the address <http://www.phy.ornl.gov/astrophysics/data/data.html>. Our site features important reaction rates, a nuclear astrophysics bibliography, links to other websites relevant to nuclear astrophysics data work, and information on organizational activities in the nuclear data community. A description of some of the features of our web site follows.

We have provided the first electronic dissemination of one of the most important compilation of reaction rates - by G. R. Caughlan and W. A. Fowler⁴. This site gives the information as originally published - the reaction rates in text format and in tabular values of rates versus temperature - as well as a downloadable FORTRAN subroutine of all 160 of the reaction rates and their inverses. We have extended the usefulness of our posting of this compilation by adding a number of features: plots, derivatives, and a graphical user interface. We added GIF and Postscript plots of each of the rates, and developed a technique to automatically generate plots of such reaction rates, so future modifications may be done with ease. We also calculated the temperature derivatives of these reaction rates, important for coupling nucleosynthesis calculations to hydrodynamics simulations to provide more accurate modeling of stellar explosions. These very complex rate derivatives were posted online in a text format, along with a downloadable Fortran subroutine.

We also created a graphical user interface based on the chart of the nuclides to allow users to search for rates of interest. We have posted for the first time the latest rates of the 12 reactions of greatest importance to the synthesis of isotopes in the early universe⁵, utilizing a format that can be easily input into astrophysics models. We have also posted the rates of the $^{14}\text{O}(\alpha,p)$ and $^{17}\text{F}(p,\gamma)$ reactions on our web site from our recent evaluation⁶, utilizing the two most popular analytical rate expression formats currently in use in astrophysics models.

Finally, a WWW nuclear astrophysics bibliography has been posted on our web site. This is a useful resource for producing evaluations of nuclear reaction and structure information important for astrophysics, as well as for other research in nuclear astrophysics. This bibliography includes references to astrophysical journals and reports which are outside

the normal scope of National Nuclear Data Center's Nuclear Science References. The first phase of this project, which includes over 1000 references, is completed and posted online, and it is anticipated that this bibliography will grow steadily in time.

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⁴G. R. Caughlan, W. A. Fowler, *At. Data Nuc. Data Tables* 20, 283 (1988).

⁵M. S. Smith, L. H. Kawano, R. A. Malaney, *Astrophys. J. Supplement* 85, 219 (1993).

⁶D. W. Bardayan, M. S. Smith, *Phys. Rev. C* **56**, 1647 (1997).