China Nuclear Data Center (CNDC) Status Report

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1. General Situation

1.1 Evaluation

The major work at CNDC during 1996~2000 is the accomplishment of CENDL-3 (China Evaluated Nuclear Data Library, version 3).

In order to set up CENDL-3, the calculating codes for fissile, structure material and fission product nuclides, and calculating method and code have been established and improved; systematics research on input parameters of fission product nuclei has been done; some evaluated method and codes have also established and improved, including adjustment of consistency between natural element and its isotopes, plot and process of double differential cross sections and so on; adjustment method and code for energy balance of a complete data set have been researched and compiled.

CENDL-3 contains about 200 nuclides. Among them, the data of 157 nuclei will be newly or reevaluated: fissile nuclei 15 ($^{233\sim239}$U, ^{237}Np, $^{238\sim242}$Pu, ^{241,242}Am), structure material nuclei 34 (natural elements Ni, Cu, Zr, Hf, Pb and their isotopes, ^{23}Na, ^{Nat}Si), light nuclei 3 (^{6,7}Li, ^{9}Be), and fission product nuclei 105 (for example, ^{85,87,Nat}Rb, $^{136,138,140\sim144}$Ce). Most evaluations of them have been finished. The remainder will be done by the end of 2000.

1.2 Calculation

The UNF program system has been established. This code system includes UNF, SUNF, NUNF, CUNF, FUNF and GUNF. With the useful tools mentioned above the nuclides calculated are about 160 for the CENDL-3.

In the theoretical model the nuclear structure effect is taken into account for multi-particle emission processes. The calculated data include the discrete levels not only for the neutron emission but also for the charged particle emission. The gamma production data can also be calculated. Since the recoil effect is taken into account exactly to maintain the energy balance both in C.M.S. and L.S. in the model, so the energy balance is fully satisfied in the output files. The recoil effect can expanse the spectra of the outgoing secondary particle. If the recoil effect were not taken into account, the spectra would have unreasonable shapes.

Since the method of the double differential cross sections have been developed, so that the file-6 data for all of kind composed particle emissions can be obtained.

A new model has been developed for calculating all kind of reaction cross sections and double differential cross sections for neutron induced reactions on light nuclei. Therefore the file-6 can given in CENDL-3. The LUNF code is developed, in which the reaction mechanisms of processes and three-body breakup processes are involved.

2. Future work, manpower and priorities

2.1 Future work

The CENDL-3 will be accomplished by the end of 2000. Therefore the future work is multi-group constant generating and validation of CENDL-3, and much improvements will be made in microscopic data.

2.2 Staff

There are 17 senior scientists at CNDC. They are engaged in various work:
Neutron data evaluation - 5;
Nuclear theory and calculation - 4;
Charged particle and photonuclear data - 1;
Nuclear structure and decay data - 1;
Fission product yield - 1;
Parameter library - 1;
EXFOR, CINDA, Data format - 1;
Data service, library management - 1;
Group constant generating - 1;
Validation - 1.

2.3 Priorities

Due to the requirement of the international exchanges and financial limit, CNDC would like to enhance the co-operations on neutron, charged particle and photonuclear data with IAEA nuclear data section and other centers. This is the top priority for CNDC.

3. Publications

"Communication of Nuclear Data Progress" (CNDP) has been published for 22 issues by CNDC and Atomic Energy Press science 1989, and it has also been distributed by IAEA Nuclear Data Section as an INDC document.