

===== Description

The FREEWARE program NKE\_m (Windows Mobile) has been created as a tool for detailed data on radionuclides properties retrieval. Though well-known Nuclide Charts (e.g. KARLSRUHER NUKLIDKARTE, Table of Isotopes) and a lot of other programs give possibilities to obtain basic information on radioactive materials, NKE\_m overcomes them when one requires quantitative information on the decaying or stable nuclide, especially if it concerns characteristics of the neutron reactions. This problem is especially important when samples are undergoing irradiation in neutron flux of experimental reactor channels to produce valuable isotopes.

That's why NKE was developed in the Division of Radionuclide Sources and Preparations of "State Scientific Centre of Russia - Research Institute of Atomic Reactors".

The program data are:

- element information;
- nuclear ground/metastable state(s) properties (half-life and decay channels percentage);
- decay alpha,beta,gamma,electron,positron radiation information (spectra and lines);
- fission products yields (for various fissionable target nuclides);
- thermal neutron cross sections and resonance integrals (capture and fission);
- fission spectrum average threshold neutron reactions cross sections for (n,p),(n,a),(n,2n),(n,n') and (n,g) reactions.

The present version of the program contains data on more than 3000 nuclides (approximately 3700 ground and metastable states). The data were mined from various public data bases. Users interact with the main program screen which is Segre nuclide chart to obtain detailed nuclide/element information. The main program window is a Serge nuclide chart and users can obtain quantitative nuclide information by clicking the corresponding cell of the chart. NKE\_m is proposed to be widely used in both the most complex transmutation and isotope production problems solving (as a data source) and educational processes in the field of nuclear physics and others.

===== To install

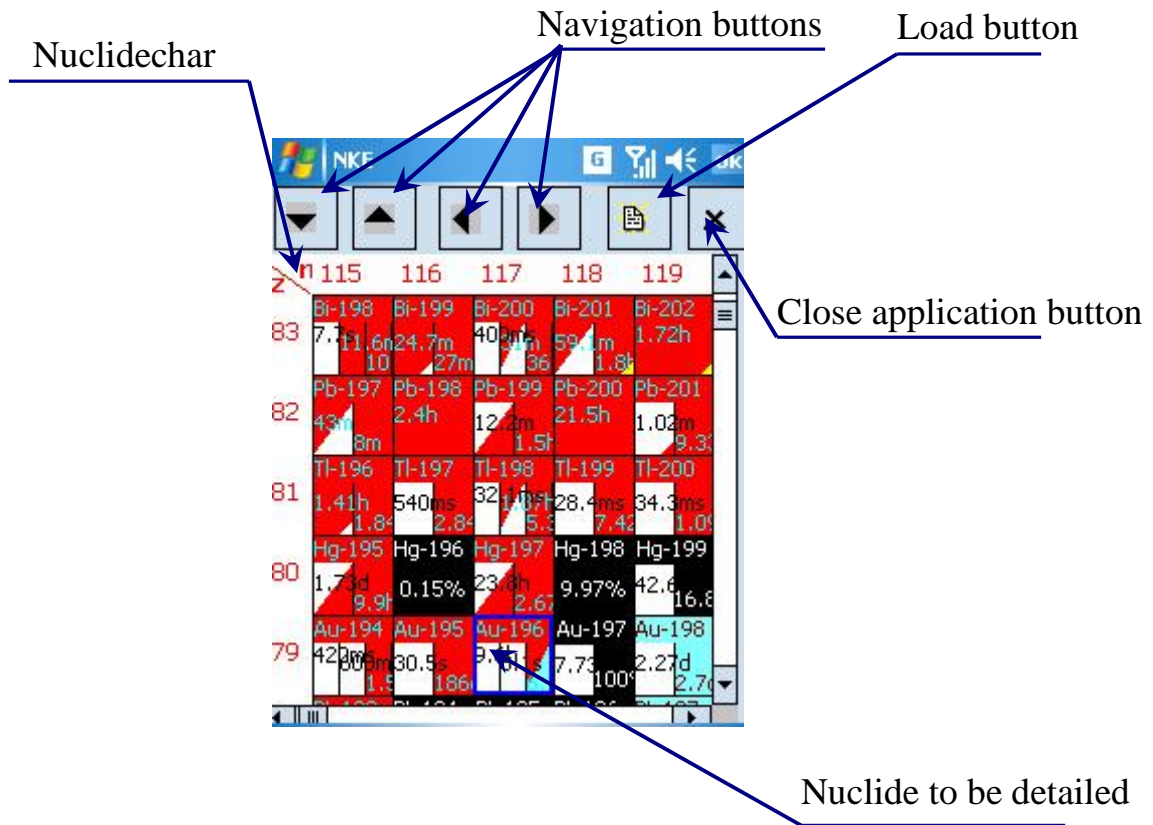
- 1) Copy files NKE\_m.exe and ORIP\_XXId.oob to PocketPC (any dir)

===== To run

Launch NKE\_m.exe

Use the Navigation buttons (or "5-way joy-stick" if you have any or scroll bars) to walk on the nuclidechart

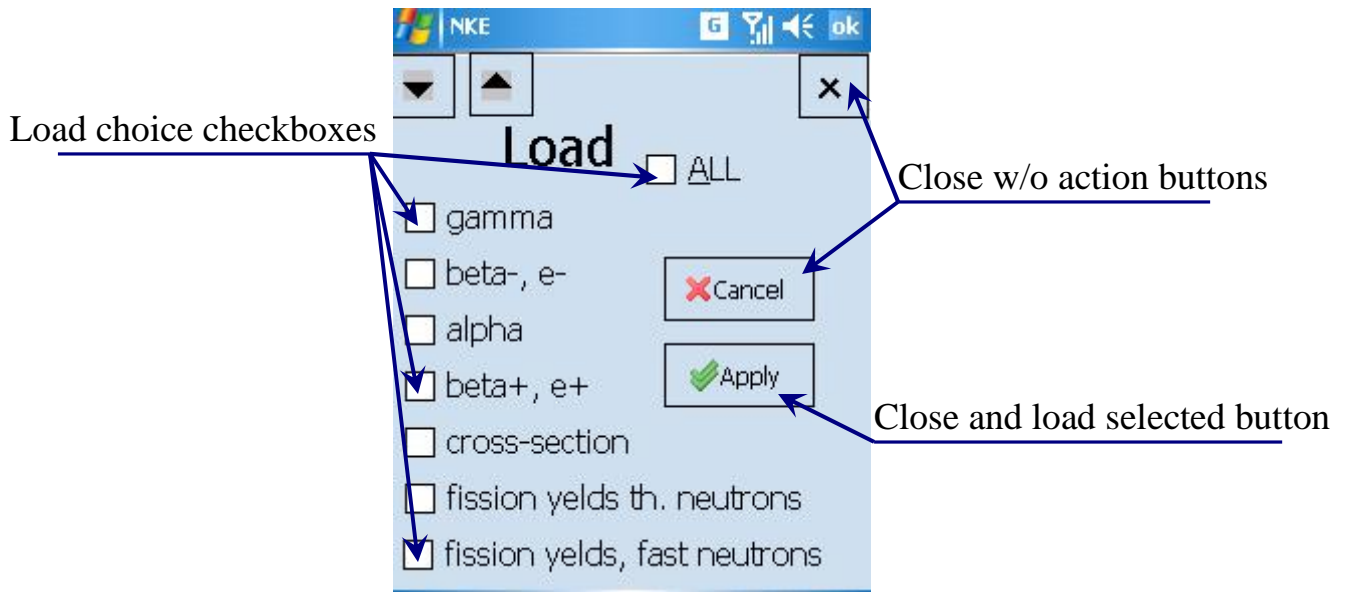
Use "Load button" above the nuclide chart grid to load detailed information available about all nuclide states (may be time and memory consuming procedure).



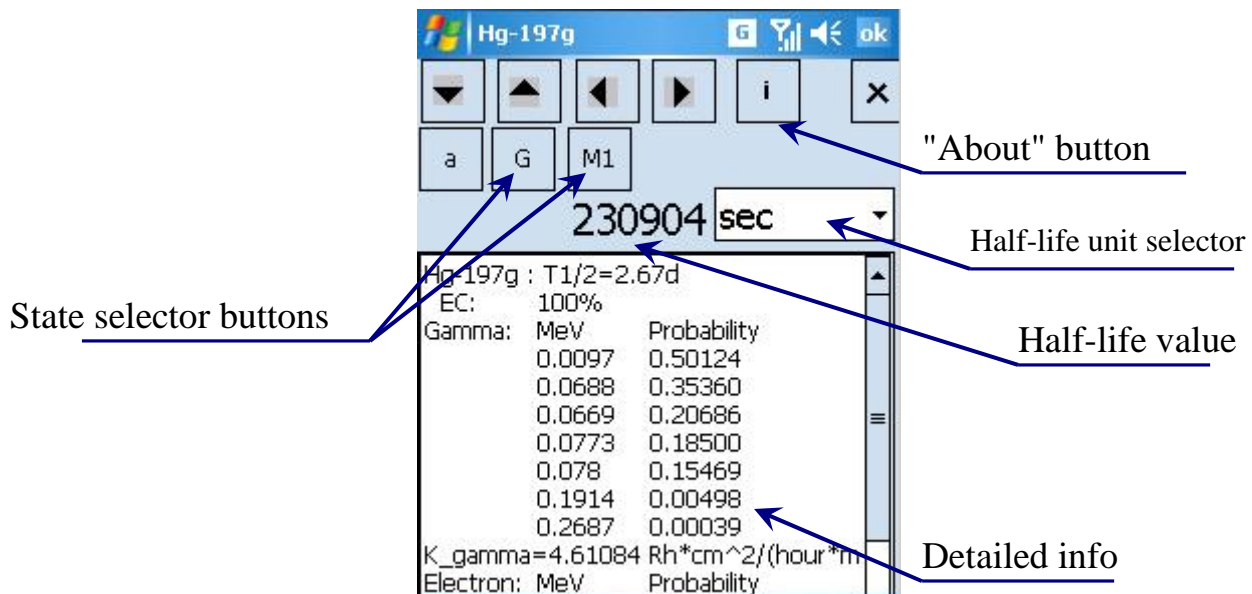
Click a nuclide square to see its detailed characteristics

The detailed information to be loaded includes:

- Gamma-lines - Checkbox "gamma"
- Beta-\Electron spectra - Checkbox "beta-, e-"
- Alpha-lines - Checkbox "alpha"
- Positron spectra - Checkbox "beta+, e+"
- Cross-sections - Checkbox "cross-section"
- Yields for thermal neutron induced fission - Checkbox "fission yields th.neutrons" - HUGE data
- Yields for fast neutron induced fission - Checkbox "fission yields, fast neutrons" - HUGE data



Detailed info about a nuclide:



Data sources

Isotopes (including isometric states):

PCNUDAT code /National Nuclear Data Center located at the Brookhaven National Laboratory, Upton, N.Y., USA, with funding from the U.S. Department of Energy/

NUCLEAR WALLET CARDS (Fifth edition) /JULY 1995, JAGDISH K. TULI, NATIONAL NUCLEAR DATA CENTER for The U.S. Nuclear Data Network, Supported by The Division of Nuclear Physics, Office of High Energy and Nuclear Physics, US Department of Energy/.

Neutron Cross Sections /Volume 1: Neutron Resonance Parameters and Thermal Cross Sections, By S.F.Mughabghab et al, ACADEMIC PRESS, 1981/

Neutron threshold reactions cross-sections:

Web sites of KAERI, BNL, ISIS, Ruhr University Bochum

<http://www.nes.ruhr-uni-bochum.de/CoN/>

<http://hpngp01.kaeri.re.kr/CoN/>

<http://sutekh.nd.rl.ac.uk/CoN/>

<http://www.dne.bnl.gov/CoN/>

<http://www2.bnl.gov/CoN/>

NGATLAS - Atlas of Neutron Capture Cross Sections

<http://www-nds.iaea.or.at/ngatlas/main.htm>

Fission Product Yields:

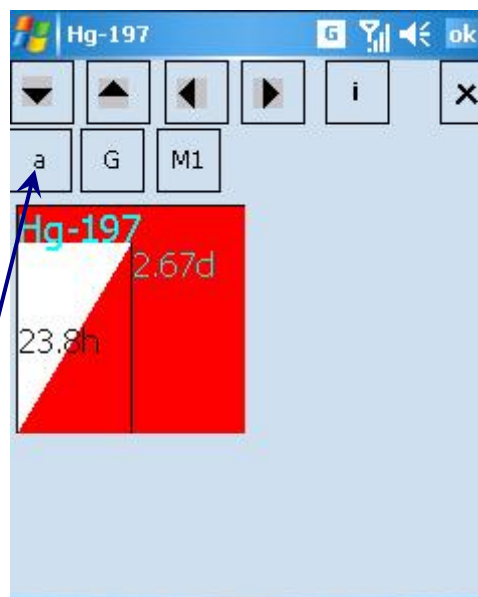
Evaluation and Compilation of Fission Product Yields, T.R. England and B.F. Rider, LA-UR-94-3106, ENDF-349, 1993.

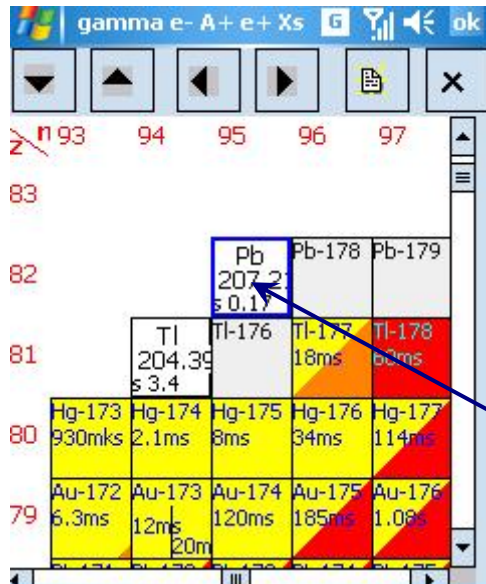
Spectra and Lines:

WINDOWS RADIATION DECAY code (original source of the data: Radiation Decay Radiation Safety Information Computational Center

K $\gamma$  (ionizing gamma constant) is calculated with the method published in V.P.Mashkov and A.V.Kudrjajtcev, Zashita ot ionizirujushego izluchenija, Energoizdat, Moskva, 1995 (In Russian)

Nuclide image button





Element to be detailed

Click an element square to see detailed info

Data sources

Elements:

I.H.Ganev, Phizika I raschet reaktorov, Moskva, 1991 (In Russian)

Handbook of Chemistry and Physics, 78th edition, D.R. Lide, editor, CRC Press, Boca Raton, FL (1997)

Element characteristics:

| Characteristic                        | Value  | Unit              |
|---------------------------------------|--------|-------------------|
| mass                                  | 207.21 | amu               |
| density                               | 11.3   | g/cm <sup>3</sup> |
| neutron absorption cross-section      | 0.17   | barn              |
| neutron scattering cross-section      | 11     | barn              |
| average lethargy loss per a collision | 0.0096 |                   |
| neutron absorption resonance integral | 0.13   | barn              |

===== To uninstall

Delete all files from the program directory

===== The author:

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Division of Radionuclide Sources and Preparations

Data Sheet - [http://roeug.50megs.com/reg\\_cv.txt](http://roeug.50megs.com/reg_cv.txt)

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