“Rosatom” Standard Reference Data System

Prof. Golashvili T.V.
ROSATOM Scientific Data Center, Director
Interdepartmental Data Qualification Commission, Chairman
ROSATOM Standard Reference Data System, Scientific Head
E-mail: gol4076@yandex.ru
Web: www.gsssd-rosatom.mephi.ru
ROSATOM STANDARD REFERENCE DATA SYSTEM
FUNCTIONAL STRUCTURE

ROSATOM STATE CORPORATION

Interdepartmental and departmental information bodies

Interdepartmental Data and Software Qualification Commission

ROSATOM Scientific Reference Data Center

IAEA, CODATA-ICSU, ACHEMA, China Nuclear Data Center, Indian Nuclear Research Center, Bombay, KRISS National Reference Data Center, ISO, IUPAC, IUPAP, CIS, «Goodfellow» (IBC, ABI)

ROSTEKH Nadzor Center – Nuclear and Radiation Safety

«STANDARTINFORM» Center

Integral Experiments and Reactor Constants Center
IPPE, Obninsk

Non-metal Structural and Fuel Materials Center
LUCH Company

Nuclear-Physical Data Center
VNIIEF

Thermophysical Data Center
IPPE, Obninsk

Radiation Protection and Safety Center
IPPE, Obninsk

Special Materials Data Center
VNIITF

Nuclear Data Center
IPPE, Obninsk

Intermediate Energy Hadron-Nuclear Reactions Center
ITEP

Radionuclide Data Center
Radium Institute

Elementary Particles Center
High Energy Physics Institute

Fuel Structural Materials and Reactor Materials Science Center
NIIAR

Intermediate Energy Hadron-Nuclear Reactions Center
ITEP

Radiation Materials Science Center
MEPhI

Elementary Particles Center
High Energy Physics Institute

IAEA, CODATA-ICSU, ACHEMA, China Nuclear Data Center, Indian Nuclear Research Center, Bombay, KRISS National Reference Data Center, ISO, IUPAC, IUPAP, CIS, «Goodfellow» (IBC, ABI)
Data Processing by Standard Reference Data System Structures to be used by Consumers in Nuclear Projects

STANDARD DATA
RECOMMENDED DATA
REFERENCE DATA

ROSATOM Scientific Reference Data Center

Interdepartmental Data and Software Qualification Commission

HTGR
VVER-440/1000
BN-350/800/1600
RBMK-1000/1500
Research Reactors, Zero-power plants

FLOATABLE NPP
FUSION REACTORS
SPACE PLANTS
ACCELERATORS

Integral Experiments and Reactor Constants Center
IPPE, Obninsk

Non-metal Structural and Fuel Materials Center
LUCH Company

Nuclear-Physical Data Center
VNIIEF

Thermophysical Data Center
IPPE, Obninsk

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Intermediate Energy Hadron-Nuclear Reactions Center
ITEP

Radionuclide Data Center
Radium Institute

Elementary Particles Center
High Energy Physics Institute

Fuel Structural Materials and Reactor Materials Science Center
NIAR

Radiation Materials Science Center
MEPhI

Reactor Core Fissile and Structural Materials
Physical and Mechanical Properties Data Center
VNIIIM

Nuclear Power Plant Coolants, Absorbers, Structural Materials Properties Center
NIKIIET
• Decay Data Evaluation Project (United Kingdom, India, China, Russia, Romania, USA, France) has developed the recommended decay data for about 200 nuclides (as on May 2013).
  - Radionuclide Data Center contribution is 40 nuclides (11 nuclides (γ-standards), 23 actinides, 6 β-emitters).
• IAEA Coordinated Research Projects
  - “Update of X Ray and Gamma Ray Decay Data Standards for Detector Calibration and Other Applications”.
References:
• M.-M. Be, V. Chiste, C. Dulieu, X. Mougeot, E. Browne, V. Chechev, N. Kuzmenko, F. Kondev, A. Luca, M. Galan, A. Arinc, and X. Huang. Table of Radionuclides (Vol.5 – A = 22 to 244). / Sevres: Bureau International des Poids et Mesures, 2010.
## Thin Targets Review

1,4621 residual nuclides were measured during 1997-2009:

### Proton energy (GeV) vs Targets

| Proton energy (GeV) | natCr | natNi | natCo | natCu | 65Cr | 56Fe | 63Ni | 63Cu | 65Cu | 69Nb | 99Tc | 181Ta | 182W | 183W | 184W | 186W | natW | natHg | 206Pb | 207Pb | 208Pb | natPb | 209Bi | 232Th | natU |
|--------------------|-------|-------|-------|-------|------|------|------|------|------|------|------|-------|------|------|------|------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0.04               | 14    | 18    | 20    |       | 19   | 9    | 19   |      |      | 19   |      |      |      |      |      |      |      |      |      |       |       |       |       |      |      |       |
| 0.07               | 17    | 21    | 22    |       | 28   | 17   | 31   |      |      | 45   | 44   | 46   | 42   | 36   | 43   | 50   | 87   | 108  |      |       |       |       |       |      |      |       |
| 0.1                | 19    | 24    | 27    |       | 37   | 18   | 31   |      |      | 22   | 22   | 20   | 26   |      |      |      |      |      |      |       |       |       |       |      |      |       |
| 0.13               | 25    | 11    | 6     |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |       |       |       |       |      |      |       |
| 0.15               | 22    | 25    | 28    |       | 46   | 40   | 53   |      |      | 65   | 65   | 63   | 63   | 71   |      |      |      |      |      |       |       |       |       |      |      |       |
| 0.2                | 29    | 29    | 29    |       | 39   | 32   | 35   | 36   | 36   | 65   |      |      |      |      |      |      |      |      |      |       |       |       |       |      |      |       |
| 0.25               | 28    | 33    | 37    |       | 58   | 53   | 69   |      |      | 94   | 94   | 94   | 95   | 106  |      |      |      |      |      |       |       |       |       |      |      |       |
| 0.4                | 31    | 37    | 36    |       | 64   | 82   | 83   |      |      | 112  | 112  | 113  | 116  | 128  |      |      |      |      |      |       |       |       |       |      |      |       |
| 0.6                | 33    | 38    | 40    |       | 75   | 101  | 104  |      |      | 139  | 140  | 141  | 141  | 147  |      |      |      |      |      |       |       |       |       |      |      |       |
| 0.8*               | 33    | 38    | 43    |       | 85   | 72   | 105  | 70   | 76   | 77   | 60   | 110  | 103  | 156  | 152  | 154  | 154  | 162  | 130  | 195  |      |      |      |      |      |       |
| 1.0                | 38    |      |      |       | 64   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |       |
| 1.2                | 33    | 39    | 43    |       | 41   | 47   | 54   | 96   | 67   | 143  |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |       |
| 1.5                | 38    |      |      |       | 35   | 36   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |       |
| 1.6                | 33    | 38    | 46    |       | 41   | 42   | 47   | 106  | 78   | 152  | 109  | 111  | 114  | 119  | 164  |      |      |      |      |      |      |      |      |      |      |      |       |
| 2.6                | 33    | 38    | 46    |       | 41   | 42   | 48   | 107  | 85   | 166  |      |      |      |      |      |      |      |      |      |      |      |      |      |      |       |

* - Moreover, $^{197}$Au was irradiated at 0.8GeV (101 product measured) and $^{56}$Fe at 0.3, 0.5 and 0.75GeV (107 products)


References

  - Titarenko Yu.E., Batyaev V.F., Zhivun V.M., et al. Measurements of the neutron field characteristics inside and on the surface of the Pb target micromodel exposed to 0.8 GeV protons. **INDC(CCP)-0448**, IAEA, October 2009;

- **Nuclear Technology, Phys. Rev.**:
  - Titarenko, Yu.E., Batyaev V., Titarenko A.Yu, et al., Cross sections for nuclide production in a $^{56}$Fe target irradiated by 300, 500, 750, 1000, 1500, and 2600 MeV protons compared with data on a hydrogen target irradiated by 300, 500, 750, 1000, 1500 MeV/nucleon $^{56}$Fe ions. **Phys.Rev. C** 78, 034615 (2008);
Compilation in EXFOR

International experimental data library (neutrons, charged particles, photo-nuclear data)

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<th>TRANS.F041</th>
<th>TRANS.F042</th>
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<td>J. H. Bjerregaard, P.F. Dahl, O. Hansen, O. Sidenius</td>
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<td>INCHEM Saccharin was homogenized in a 90 deg. deflecting magnet and had an energy spread of equal to 1% on the target</td>
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<td>The targets were prepared either in the isotope separator or by vacuum evaporation. Thin (50 μg/cm²) carbon backing was employed. The target thickness varied from 5 μg/cm² to 10 μg/cm²; the useful target area was 0.5 mm²-1 mm²</td>
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<td>Target enriched in S2Cr to 96% was vacuum evaporated from the metal or the oxide of natural element, the chemical purity being higher than 99.9%</td>
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386 data sets

Table of contents: TRANS.F041:

- $^{12}$C – 7 reactons;
- $^{13}$C – 6 reactons;
- $^{10}$B – 7 reactons;
- $^{11}$B – 3 reactons;
- $^{16}$O – 15 reactons;
- $^{27}$Al – 3 reactons;
- $^{28}$Si – 7 reactons etc.
EXFOR Meeting, May 23-27, 2011

ZCHEX
ZORDER, (NDS, IAEA, Austria, USA)

JANIS Trans Checker,
(NEA DATA BANK, France)
Main Tasks

• New generation codes development.
• Development of data bases comprising nuclear-physics constants, substance and materials properties in the field of nuclear science, technique and technology
• Reference data qualification in the field of nuclear-physics constants, substance and materials properties in the field of nuclear science, technique and technology
• Development and publishing of the guides and charts in the field of physical constants and substances and materials properties within the frames of national and international cooperation
• 1. Many members of the Interdepartmental Data and Software Qualification Commission are the experts in the design of nuclear reactors, as well as in the evaluation of nuclear-physical data used in the reactor designs.

• 2. In evaluation of nuclear data much attention is paid to the data verification and validation.

• 3. We are engaged not only in experimental data, but codes too.
Development of scientific and methodological documents to support functioning ROSATOM Standard Reference Data System

The work results:
• An electronic version of Nuclear and Radiation Safety Thesaurus for the CIS countries.
• Tables of thermal properties of gaseous media depending on temperature and pressure.
ROSATOM Scientific Data Center efforts within Russian-Chinese cooperation framework resulted in designing wall-type chart of nuclides, which includes 9 nuclear characteristics for 3880 nuclides recommended by international and national organizations (evaluated data from ENSDF, IAEA and other organizations of Russia, Japan and China have been used). The Chart repeatedly published in Russian and English languages beginning from 1995. Below are the individual boxes from the chart and overall appearance.

<table>
<thead>
<tr>
<th>Ce 139</th>
<th>Th 233</th>
<th>U 239</th>
<th>Cm 246</th>
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<tr>
<td>-86952 (7)</td>
<td>38733.2 (20)</td>
<td>50573.9 (19)</td>
<td>62618.4 (21)</td>
</tr>
<tr>
<td>3/2+</td>
<td>1/2+</td>
<td>5/2+</td>
<td>0+</td>
</tr>
<tr>
<td>137.64 (2) d</td>
<td>22.15 (8) min</td>
<td>23.46 (4) min</td>
<td>4723 (27) y</td>
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<tr>
<td>$\beta^-$</td>
<td>$\beta^-$</td>
<td>$\beta^-$</td>
<td>$\alpha$, SF</td>
</tr>
<tr>
<td>Q* 270 (3)</td>
<td>Q* 1243.1 (14)</td>
<td>Q* 1261.5 (16)</td>
<td>Q(\alpha) 5476.7 (9)</td>
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<tr>
<td>$\langle \gamma \rangle$ 132.52 (7)</td>
<td>$\langle \gamma \rangle$ 33.2</td>
<td>$\langle \gamma \rangle$ 50.3 (20)</td>
<td>$\langle \gamma \rangle$ 0.0138 (4)</td>
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<tr>
<td>$\gamma$ 165.858</td>
<td>$\gamma$ 29.37 86.48 459.22</td>
<td>$\gamma$ 43.533 74.664</td>
<td>$\gamma$ 44.55 102.8</td>
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</tbody>
</table>
Nuclide guides in Russian, English and Chinese repeatedly published since 1995. Below are the individual boxes from the guide.

| 92-U-236 | <α> 4490(250) | <e> 8.8 | <γX> 1.2(3) |
| 92-U-237 | <β> 68(6) | <e> 110 | <X> 61 | <γ> 75.5(8) |
| 92-U-238 | <α> 4187(30) | <e> 8.8 | <γX> 1.2(1) |
| 93-Np-234 | <β> 0.17(4) | <e> 35 | <X> 70 | <γ> 1030(30) |
| 93-Np-237 | <α> 4842(1) | <e> | <γX> 30 |
| 93-Np-238 | <β> 210(10) | <e> 35 | <X> 6.3 | <γ> 582(9) |
| 93-Np-239 | <β> 118(4) | <e> 85 | <X> 57 | <γ> 118.2(7) |
| 94-Pu-236 | <α> 5760(25) | <e> 9.6 | <γX> 1.58(7) |
| 94-Pu-237 | <α> 9.1(4) | <e> | <γX> 52.5(10) | <α> 0.23 |
| 94-Pu-238 | <α> 5486(5) | <e> 9 | <γX> 1.4 |
| 94-Pu-239 | <α> 5146(6) | <e> 4.8 |
| 94-Pu-240 | <α> 5155(8) | <e> 11 | <γX> 1.3 |
| 94-Pu-241 | <α> 0.114(2) | <β> 5.8(1) | <γX> 0.0017 |
| 94-Pu-242 | <α> 4892(12) | <e> 7 | <γX> 1.1 |
| 94-Pu-243 | <α> 159(20) | <e> 6.4 | <γX> 27(4) |
| 94-Pu-244 | <α> 4576.1(5) | <e> 4.3 | <γX> 0.78 |
ROSATOM Scientific Data Center prepared and published the Periodic Table of chemical elements, including physical characteristics and properties of the chemical elements (authors: Golashvili T and Demidov A.). The table includes such features as atomic number, mass number, relative atomic mass, oxidation state, electron configuration, nuclide abundance, isotope half-life for 112 elements. Below are our notation and boxes for Ca, Rb, Zr and Xe.
### CALCIUM

**Ca**

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40.078

$[\text{Ar}]4s^2$

**Ca**

**20**

40, 42 - 44, 46, 48

34* - 39*, 41*, 45*, 47*, 49* - 57*

+2

**[Lat. calx, calcis - lime (“soft stone”)]**

Calcium is a medium hard, silvery, typical alkaline earth metal. English chemist H. Davy in 1808 isolated metallic calcium from hydrate of lime with electrolysis. Pure metallic Ca is used in the metatallurgical process to produce rare-earth metals. $^{40}\text{Ca}$ is used to produce superheavy elements in accelerators. Lead of accumulator battery plates is doped with calcium. Ca is used in calcium-base babbites; in chemical current sources. Monocrystals of calcium fluoride (fluorite) are used in optics (astronomical lenses, prisms), and as a laser material. Monocrystals of calcium tungstate (scheelite) are used in laser equipment. Calcium carbide is widely used to produce acetylene. Calcium oxide being both free and as part of ceramic mixtures is used to produce refractory materials. Calcium compounds are widely used as antihistaminic preparations. Calcium ions play a significant role in animal organisms (calcium channels). Calcium is an important element to form skeleton. Loss of calcium ions results in osteoporosis.

<table>
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<th>T$_{1/2}$ [Y]</th>
<th>M</th>
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<tr>
<td>$^{45}\text{Ca}$</td>
<td>162.67(25) d</td>
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<tr>
<td>$^{47}\text{Ca}$</td>
<td>4.536(3) d</td>
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### RUBIDIUM

**Rb**

85.4678

$[\text{Kr}]5s^1$

**37**

85, 87

71* - 84*, 86*

88* - 102*

+1

**[Lat. - rubidius - due to red color in spectrum]**

Rubidium is a soft, silvery, chemically active alkali metal, extremely unstable in air (it ignites when reacts with air in presence of trace water). It forms all kinds of salts. It was discovered by R.W. Bunsen and G.R. Kirchhoff (Heidelberg, Germany) in 1861. Metallic rubidium was produced by R.W. Bunsen in 1863. $^{85}\text{Rb}$ is used in γ-flaw detection, measuring equipment. Rb and its alloys are used in photoconverters, as coolant and working fluid of high-temperature turbines; a catalyst to treat oil, to synthesize m ethanol and higher alkohols, in-situ coal gasification and to produce artificial liquid fuel; as lubricant in vacuum. Rubidium chloride is used to measure high temperatures (up to 400 °C). Rb plasma is used to drive laser emission. Rubidium chloride and rubidium hydroxide are used in fuel cells as electrolyte.

<table>
<thead>
<tr>
<th>T$_{1/2}$ [Y]</th>
<th>M</th>
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<tbody>
<tr>
<td>$^{81}\text{Rb}$</td>
<td>4.570(4) h</td>
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<tr>
<td>$^{82}\text{Rb}$</td>
<td>1.273(2) min</td>
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<td>$^{83}\text{Rb}$</td>
<td>86.2(1) d</td>
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<tr>
<td>$^{84}\text{Rb}$</td>
<td>33.1(1) d</td>
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<tr>
<td>$^{85}\text{Rb}$</td>
<td>18.642(18) d</td>
</tr>
<tr>
<td>$^{89}\text{Rb}$</td>
<td>15.15(12) min</td>
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</table>
Zirconium

\[ Zr \]

\[ ^{90} \text{Zr}, \, ^{92} \text{Zr}, \, ^{94} \text{Zr}, \, ^{96} \text{Zr} \]

\[ 78^* - 89^*, \, 93^*, \, 95^* \]

\[ 97^* - 110^* \]

\[ \text{[Kr]}4d^25s^2 \]

\[ +4, +3, +2, 0, -2 \]

[Arabic - zarkun (cinnabar) or Persian - zargun (gold-like)]

Zirconium is a grayish-white, lustrous, stable to corrosion metal. Zirconium dioxide was first isolated in 1789 by Germany chemist M.H. Klaproth as a result of zircon analysis. Zr is used as a structural material in nuclear and chemical reactors, as a smokeless agent in signal lights of pyrotechnics and primers; as superconducting alloy (Nb/Zr); as a refractory material for refractory facing in glass-melting and iron-and-stainless furnaces; in structural ceramics, enamels and glazes; in prosthetics; zirconium carbide is used as a structural material in solid core nuclear jet engines; zirconium beryllide is used in aerospace engineering (engines, effusers, reactors, radiotrace electric generators); zirconium hydride is used as neutron moderator in nuclear reactors. Fianites (cubic zirconia), produced by modifying zirconium dioxide, are used as optical materials, in medicine (surgical instrument), as synthesized jewellery (colour dispersion, index of refraction and iridescence are higher than those of diamond), in producing man-made fibers.

Xenon

\[ \text{Xe} \]

\[ ^{124} \text{Xe}, \, ^{126} \text{Xe}, \, ^{128 - 132} \text{Xe}, \, ^{134} \text{Xe} \]

\[ 136, \, 110^* - 123^*, \, 125^* \]

\[ ^{131.293} \text{Xe} \]

\[ 127^*, \, 135^*, \, 137^* - 147^* \]

\[ \text{[Kr]}4d^{10}5s^25p^6 \]

\[ +8, +6, +4, +2, 0 \]

[Greek - χεινος - strange (discovered as an impurity)]

Xenon is a monoatomic, odorless, colourless gas. It was discovered by English scientists W. Ramsay and M.W. Travers in 1898. The first chemical xenon compound (XePtF\(_6\)) stable at room temperature was reported by Neil Bartlett in 1962 in Canada. Xenon is used in filament lamps, powerful gas-discharge and flashing light sources; as a preparation for general narcosis; as high efficiency working fluid for electroreactive (ion and plasma) spacecraft engines; radioactive xenon isotopes are used as radiation sources in radiography and diagnostics in medicine, i.e. in detection of the medical equipment; xenon fluorides are used for metal passivation; liquid xenon is a working fluid for high power lasers; xenon fluorides and oxides are used as oxidizing agents for rocket propellant, as well as components of the mixtures for blow out high power laser weapon of earth-based anti-aircraft defense, and space-based lasers. Xenon fluorides are toxic.

<table>
<thead>
<tr>
<th>Isotope</th>
<th>( T_{1/2} ) (Y)</th>
<th>M</th>
</tr>
</thead>
<tbody>
<tr>
<td>(^{131}\text{mXe})</td>
<td>11.934(21) d</td>
<td></td>
</tr>
<tr>
<td>(^{133}\text{Xe})</td>
<td>5.243(1) d</td>
<td>132.90599(26)</td>
</tr>
<tr>
<td>(^{133}\text{mXe})</td>
<td>2.19(1) d</td>
<td></td>
</tr>
<tr>
<td>(^{135}\text{mXe})</td>
<td>9.14(2) h</td>
<td></td>
</tr>
</tbody>
</table>
International Cooperation

1. Participation in implementation of CIS Member States Framework Cooperation Program in the field of peaceful utilization of nuclear energy for the period up to 2020: "ATOM - CIS Cooperation " adopted by resolution of Council of Heads of CIS Governments of May 19, 2011
The result: Development and preparation for publication of Nuclear and Radiation Safety Thesaurus for CIS countries.
2. Participation in Russian-Chinese nuclear data working group (15 - 23 October 2012, Beijing, China).

**Reasons:** Resolution of China-Russia intergovernmental commission on preparation of Russia/China Prime Ministers annual meetings (Minutes of meeting of Nuclear Data Subcommittee No 14 of 30 August 2010 (Beijing, China), and No 15 of 15 September 2011 (Moscow, Russia).  

**Result:** Development and publication of Nuclide Guide in three languages: Russian, Chinese and English (authors: T. Golashvili, etc.), Cooperation Memorandum between ROSATOM Scientific Data Center and Nuclear Data Center of China Institute of Atomic Energy.
CODATA President and Executive Director Letter
to Rosatom State Corporation Leadership

CODATA
Committee on Data for Science and Technology of the International Council for Science

To:
S. V. Kirienko
Director General
“Rosatom” Corporation

I. M. Kamenskikh
First Deputy Director General
“Rosatom” Corporation

V. A. Pudodeko
Deputy Director General
“Rosatom” Corporation

Copy: O. O. Patnack
Head of Division of International Scientific Program
“Rosatom” Corporation

October 31, 2012

Dear Colleagues,

We were very glad that Dr. Golubovich I. V. was able to attend the 23rd International CODATA Conference in Taipei, Taiwan and contribute to its success. He presented a report on the Russian National Standard Reference Data System and Nuclide Guide, International Chart of Nuclides 2012. The President of CODATA, Professors Rosati, Vodar, Dubric, Rumble, Switov and Lai greatly appreciated, as I do myself, the valuable contribution provided by Dr. Golubovich in improving communication on the extremely important activities of CODATA/SCII. He personally reported on this at many international meetings.

At the 22nd CODATA Conference he succeeded in presenting International Chart of Nuclides 2012 and project “Evaluation data exchange. Properties of substances and materials utilized and produced by nuclear industry”, that has been discussed too. This project appears to have considerable promise and in my mind should be recommended for implementation. In addition to this we will look for the opportunity to publish the new edition of International Chart of Nuclides with participation of scientists from China, France, Germany, Japan, Russia and the USA.

The above mentioned activity is important for both the nuclear science and engineering and radiation ecology, medicine, agriculture etc. China-Russia cooperation in the field of developments of the charts nuclides, nuclide guides and reference nuclear data is a good example of international cooperation in the field of peaceful utilization of nuclear energy.

Yours sincerely,

[Signature]

Prof. Huading Guo
CODATA, President

Kathleen Cass
CODATA, Executive Director
TRANSPORT AND THERMOPHYSICAL PROPERTIES

- *Thermophysical Properties Research Center (TPRC) Data Series*, edited by Y. S. Touloukian, Director, Thermophysical Properties Research Center, Purdue University Research Park, 2595 Yeager Road, West Lafayette, Indiana 47906, U.S.A., and C. Y. Ho, Head, Data Tables Division, Thermophysical Properties Research Center.

- The titles and estimated number of pages of the 13 volumes are as follows:
• Volume 1. Thermal Conductivity, Metallic Elements and Alloys (1600 pp),
• Volume 2. Thermal Conductivity, Nonmetallic Solids (1300 pp),
• Volume 3. Thermal Conductivity, Nonmetallic Liquids and Gases (700 pp).
• Volume 4. Specific Heat, Metallic Elements and Alloys (820 pp),
• Volume 5. Specific Heat, Nonmetallic Solids (1730 pp),
• Volume 6. Specific Heat, Nonmetallic Liquids and Gases (380 pp),
• Volume 7. Thermal Radiative Properties, Metallic Elements and Alloys (1650 pp),
• Volume 8. Thermal Radiative Properties, Nonmetallic Solids (880 pp),
• Volume 9. Thermal Radiative Properties, Coatings (1690 pp),
• Volume 10. Thermal Diffusivity (500 pp),
• Volume 11. Viscosity (400 pp),
• Volume 12. Thermal Expansion, Metallic Elements and Alloys (1000 pp).
• For a complete description of the Thermophysical Properties Research Center and previous TPRC publications, refer to section 3.4.20., CODATA International Compendium of Numerical Data Projects.

• Tables of data on specific volume, enthalpy, entropy, specific heat, and velocity of sound in gaseous and liquid methane are given for temperatures and pressures up to 1000 K and 1000 bars respectively. For temperatures up to 500 K and pressures up to 500 bars, the experimental data on diffusion coefficients, thermal conductivity, viscosity, and Prandtl numbers are also correlated.
ROSATOM Standard Reference Data System value is measured by experience of our experts.
Without the unified safety standards at the level of entire planet the world nuclear power will develop in a vulnerable mode.
At international conferences
У стенда
В зале заседаний 2007
Awarding
Interdepartmental Reference Data Qualification Commission Meeting
Intensifying ROSATOM Standard Reference Data System and Scientific Data Center activity on the principle items as follows:

• put into practice the mandatory use of qualified reference data in development of nuclear hazardous facilities and installations, and modes of operation thereof during entire life cycle up to decommissioning and disposal;
• implement compulsory qualification of the data included in the software used in development of nuclear facilities;
• introduce the requirement about obligatory use of the qualified techniques used during qualification of data and software;
• begin the activity on formation of ROSATOM State Corporation Standards, including the evaluated neutron data library, nucleus decay nuclear/physical characteristics library, Russian dosimetric file;

• begin the activity on training the specialists in the field of data acquisition, compilation, evaluation and standardization concerning nuclear-physical constants and substances and materials properties for nuclear science, technique and technology, as well as medicine, space, ecology and agriculture;

• utilize predominantly theoretical methods in developing new data by calculation, which requires infinitely less time and cost than an experiment does.