

Development of radiation technologies in the 21st century

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The total number of ionizing radiation sources in the world is more than 14 million units, of which X-ray tubes are ~ 4 million units, and radioactive sources of various types are ~ 10 million units. Including modern technological diagnostic installations ~ 94 thousand units, and installations for radiation therapy ~ 20 thousand units.

Radiation technologies are used in many industries –nuclear power, nuclear medicine (radiation diagnostics and radiation therapy), industry and construction (modification of the properties of substances, creation of new materials, sterilization of products, flaw detection, production of radiopharmaceuticals), agriculture (disinsection of grain, processing of products to extend the shelf life, increasing seed germination), solving environmental problems (treatment of flue gases of coal-fired thermal power plants, wastewater treatment, decontamination of contaminated areas) and much more.

At present time there are more than 150 thousand units of ionizing radiation sources, including devices, installations and complexes using X-ray radiation ~ 65 thousand units In Russia. Installations, devices, closed sources using radionuclides, and reactors, storage facilities for radioactive substances and waste from nuclear reactors in the country's economy ~ 80 thousand units, including radioisotope devices and installations ~ 15 thousand units and 128 nuclear reactors. Storage facilities for radioactive substances and waste from nuclear reactors ~ 650 units. Charged particle accelerators in our country ~ 500 units. (~ 400 units electron accelerators and ~ 90 units of protons and ions), in other organizations, structures, etc. ~ 8400 sources of ionizing radiation. Including ~ 200 in medicine, ~ 50 in scientific and educational organizations, ~ 250 in the national economy (including accelerators at customs, Rosatom structures and other enterprises).

The rate of emergence and spread of high-tech radiation technologies in various industries is extremely high, and their number doubles approximately every seven years. The most important direction is the search for new ideas for increasing the acceleration rate and reducing the size of accelerators, and the creation of compact accelerators on "cold" magnets, which will significantly (several times) reduce the size of installations.

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