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DEVICES FOR REGISTRATION OF IONIZING RADIATION

Abstract: *Why do we need to measure the level of ionizing radiation*

Ionizing radiation, or radiation, has a negative effect on living organisms.

With direct exposure to IO, living cells are destroyed, the work of tissues / organs is disrupted, radiation burns develop, acute radiation syndrome. With prolonged exposure, the risk of developing cancer increases.

The measurement of the level of ionizing radiation (IO) is carried out to assess the safety of production lines, scientific research and dosimetric control of the population.

The degree of negative impact determines the type and level of radiation. This is an electromagnetic field (gamma particles) or a stream of elementary particles (neutrons, protons, beta, alpha particles).

Key words: *The level of ionizing radiation, semiconductor detectors, gamma radiation, radiation spectrometers, dosimetry, radiometry.*

Language: *English*

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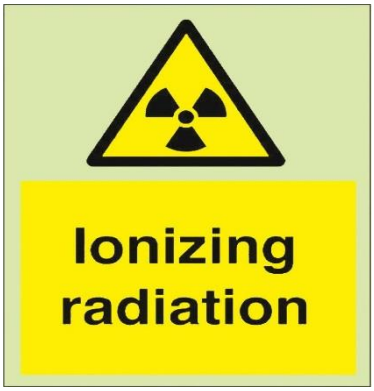
Introduction

Classification of radiation detection devices. The level of ionizing radiation is measured using spectrometers, dosimeters, radiometers. The principle of operation of the measurer depends on the fixed parameters:

-Radiometric - measurement of the activity of radionuclides - sources of ionization.

-Dosimetric - measurement of absorbed energy.

-Spectrometric - measurement of particle energy.



Picture 1

Semiconductor detectors - Semiconductor ionizing radiation detectors are used for gamma and X-ray spectrometry, as well as as counters of the number of particles. Semiconductor nuclear radiation detectors work similarly to an ionization chamber, but ionization occurs in the crystal thickness, and not in a gaseous medium. This allows you to reduce the size of the devices while maintaining their efficiency. The first gamma-ray detectors based on semiconductor crystals appeared in the 1960s and were used to register heavy charged particles.

Where gamma radiation detection units are used-

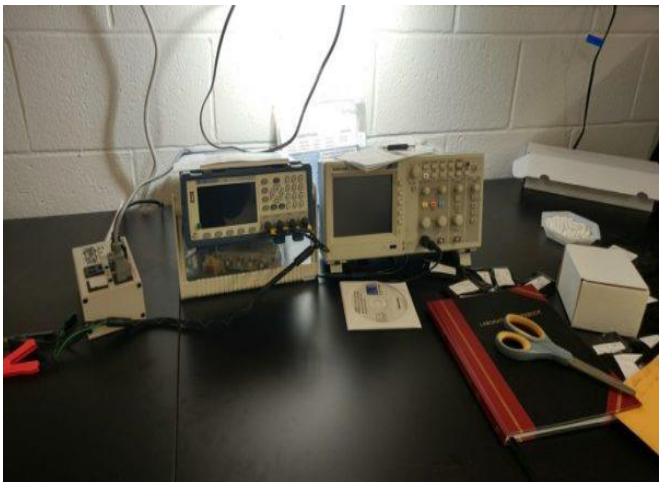
- Nuclear energy.
-Space exploration.
-Biophysics, geophysics, nuclear physics.
-Medicine. Tomographs, mammographs, X-ray diagnostic systems.
-Flaw detection.
-Security systems at airports, train stations, crowded places.
-Experimental physics.

Ionizing radiation spectrometers - Radiation spectrometers are used in industrial enterprises of nuclear power, in mechanical engineering, mining, medicine, scientific laboratories, which are characterized by reliability and accuracy of measurements. Spectrometric analysis is based on the conversion of the energy of charged particles into electrical signals, the amplitude of which is commensurate with the energy lost by the particle in the detection unit.

Radiometric and dosimetric devices of ionizing radiation - Radiation and dosimetric monitoring devices allow measuring and evaluating the intensity of ionizing radiation. Dosimetric and radiometric devices are used to measure alpha, beta, gamma, X-ray, neutron radiation.

Dosimetry - Dosimeters measure the radiation dose. The main task of dosimetry is to assess the degree of danger of ionizing radiation in various radiation conditions.

Radiometry - Radiometric devices (alpha, beta, gamma radiation radiometers) register the intensity of radiation exposure - the activity of radionuclides in ionizing radiation sources (liquid, gas, aerosol, contaminated surface) at the current time.



Picture 2

Radiation Dosimetric control (RDC) is carried out in two directions:

- measurement of individual doses of external radiation and individual doses of internal radiation of personnel,
- measurement of MED, volumetric air activity, surface contamination levels in serviced, periodically serviced premises and at the NPP site.

The ionization of the medium increases with an increase in the dose rate of penetrating radiation and the duration of exposure. Exposure detection is possible with the help of ionizing substance detectors. Using equipment that measures the level of IO, we control the radiation dose.

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