PREVENTION OF RADIOACTIVE GAS SEEPING INTO BUILDINGS THROUGH CONSTRUCTIVE MATERIALS

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One of possible method of realization of the terrorist acts is using gases and liquids, which easily permeate through the constructive materials of walls, floor, ceiling, roof, etc. into buildings by the capillary action of the pores. Toxic volatile organic compounds, organic and inorganic gases, radioactive elements, especially, which emits alpha particles can be used as the dangerous substances. Increased ventilation may help in removing the gases, but can actually increase the gases level by increasing the suction through the pores of concrete. If the gases and liquids are soluble in water and are easily volatilized from it, they can also get by groundwater up to underground structures and penetrate inside through opening and pores in concrete or pushed by hydrostatic pressure.

The purpose of this work is creating a method to reduce concentration of toxic and radioactive gases in homes, buildings, underground buildings, tunnels, hangars, garages, bombshelters, etc.

The most effective method to prevent penetration of radionuclides into premises of buildings and underground structures through walls, roofs, floors is using special chemicals, which seal micropores inside the construction materials against gases. Worked out chemicals which consist of blend of polymeric compounds are described in the paper.

Radioactive gases permeability in constructive materials after treatment by chemicals was studied. Influence of types of cement, sand and gypsum, preliminary treatment by different chemicals, different types of polymeric compounds, time between treatments, moisture of materials, time between preparation of chemicals and treatment of materials (aging of chemicals), time between treatment of concrete and testing (aging of treated concrete) were examined. Experiments have shown that our method allows reducing the coefficient of gas permeability 200 – 400 times.

SCINTILLATION γ–SPECTROMETRICAL METHOD OF ATMOSPHERIC FALLOUTS OF ^{7}BE ACTIVITY DETERMINATION.

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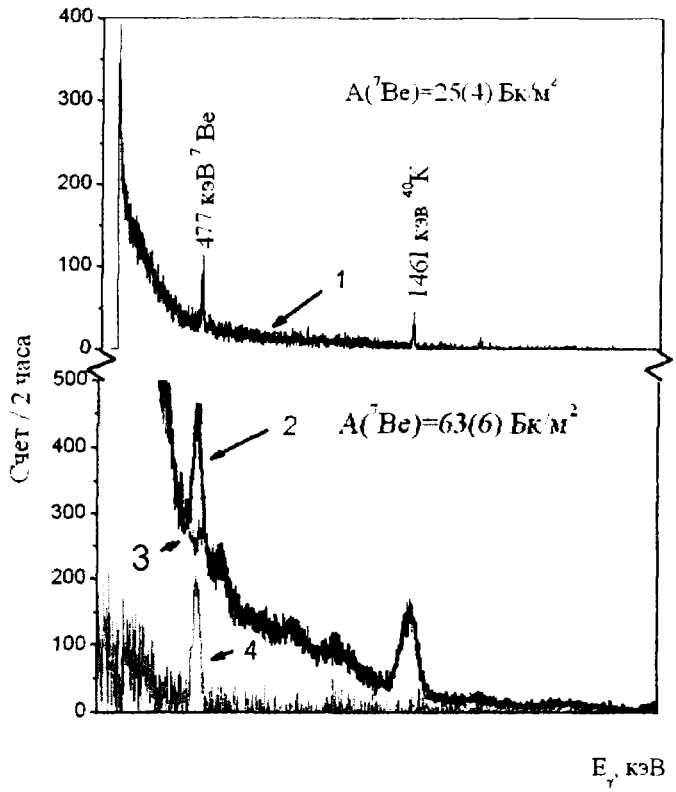
Cosmogenous radionuclide ^{7}Be (T1/2=53,3 days, E_γ =478 keV) is formed in upper layers of atmosphere as the result of oxygen atoms splitting by cosmic radiation.

By used method of its fallout on Earth surface it is collected on gauze plane table 1 m^2 area placed in metal ditch. In a case of accumulation of rain and/or snow water in metal ditch it is evaporated until dry remainder, and exposed gauze is ashed in muff oven at temperature $t \leq 400^0C$. Ash and dry remainder (8-25 g) is packed in small package and its spectra (see 1 on pic.) is measured on γ–spectrometer with SSD. It is quite possible evaporation of the part of ^7Be in this method.



We have worked out method that exclude this opportunity and rising effectiveness of ^7Be γ–activity. It concludes from: gauze is consequencely moisten with water from the ditch and dried at temperature $t \sim 60^0C$. Procedure is kept until full drying of ditch. Afterwards, gauze (~100) is packed in one-liter Marinelli vessel and its γ-spectra (2) is measured on scintillator γ-spectrometer with NaJ(Tl) Ø63x63 mm. Background contribution (3) in this spectra is established at measurements of unexposed gauze. The resulting spectra after subtraction of background contains only component stipulated by γ-activity of 478 keV ^7Be (4) by which it is determined.

ATMOSPHERIC FALLOUTS OF ^7Be, WEATHER PHENOMENA AND SOLAR ACTIVITY

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Radionuclide ^7Be ($T_{1/2}$ = 53,3 d, E_γ = 478 keV) is formed in upper layers of atmosphere in splitting reactions of oxygen and nitrogen nuclei with cosmic rays. Intensity of its formation is linked with solar activity and fallouts to Earth surface with geophysical and weather phenomena.