Increased radon yield as a response of the environment to vibration: mechanisms and approaches

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There are quite a few studies examining the release of underground radon gas to the earth's surface and from laboratory samples. Among them, there are very few such , taking into account the vibrational nature of the solid medium, from which the radon gas 222Rn is separated. Most research on the relation between the amplitude variation of the radon concentration and the characteristics of the high-energy seismic events. Low-amplitude events are usually not considered, although it is with their participation that the lives of people and the surrounding animal and plant life occur.

Quite a weighty argument is that radon is transported by gases occurring in the earth's crust. So the concentration of radon even in the subsurface atmosphere is insignificant: 18 orders of magnitude lower than the concentration of nitrogen. Therefore, the joint study of the fluctuations of the environment and the capacity of the migration channels of gaseous radon, and hence its carrier gaseous fluid, is an important task.

To study the possible mechanism of vibration vibrations influence on the amount of radioactive gas released, and even more so to control this mechanism, it is important to identify the key characteristics of the studied objects. So fluctuations of rocks are characterized by amplitude, speed, acceleration of particles of the environment, and also frequency. If generalized, the total energy of oscillations. In most of the published articles on the topic adopted the provision that the more energy is supplied to the environment, the greater the yield of radon. Meanwhile, the experiment may give other results.

For the environment, when it comes to the transfer of fluid through it, it is customary to take into account the type of rocks composing the site in question, the presence or absence of sources of fluid(radon) at the site, to determine the level and direction of groundwater movement, and most importantly to find porosity and permeability. The environment is assumed to be solid by default, which is justified for simplicity of description. However, the study of geomedium shows not only the presence of various inhomogeneities, faults, cracks, etc., but composing solid elements: blocks, grains, individual inclusions. The diversity of the migration environment of the fluid(radon) finds different response to the frequency of vibroseis stimulation. For example, the result of the maximum radon yield from granite samples at a frequency of about 16 Hz was experimentally obtained in the IDG RAS. At a close frequency of 16, 6 Hz, according to the field data of the region Nelidovo-Ryazan tectonic structure, there is a close relationship between the amplitude of radon emanation and the relative amplitude of microseismic oscillations. Both of these results show the selectivity of the medium on the frequency of exposure.