Radon a radioactive element in environment and its effect

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Abstract

Radiation is the flow of energy in the form of particles or as a waves through any material medium. The earth is radioactive since its creation, but inhaling and ingestion of these radioactive gases above an allowed level becomes a health hazard. So, observation of radioactive material is necessary for environmental protection. Around 90% of the human radiation exposure arises naturally by cosmic rays, radon gas and other radiation like radiation by natural radioactive materials on earth including Uranium, Thorium and Radon.

Key words: Radon, Thoran, inhalation, exhalation, indoor radon, LR-115, CR-39

1.1 Introduction

More than 55% of radiation dose delivered to mankind on earth is due to Radon only. Radon is a naturally occurring highly radioactive, colorless, odorless, inert gas and it is present all around as a part of air, water and soil, rocks and inhaling or ingestion of Radon can cause severe health problems including respiratory issues, lung cancer. This is the main reason that Radon measurements have been carried out since past recent years. [1-5]

1.2 Sources of radon in houses [1, 3, 4]

Radon is a tasteless and odorless gas is created by the normal breakdown of Uranium in the soil and rocks and it enters in a house or buildings through the cracks in the earth. And also it generates from number of sources, including:

- Building materials, including silicone –rich magmatic rock like granite, gypsum, cement, and other earthy materials etc.
- Inhaling contaminated air entering into our homes through splits in the establishment, dividers, and floors. Radon levels are most elevated in rooms nearest to the ground, so if an individual spends more time in the basement rooms at their homes , he or she has a highest risk for the exposure to radon .
- Ingesting contaminated water like, deep wells have a high concentration of radium.
- Clocks and watches can also add to the overall radon concentration in homes, as if an individual uses one which has luminous dial.

1.3. Radon-Harmful Effect

The stones and soil underneath our homes contain hints of Uranium. Which continuous to decay with the emission of different radiation. Radon is one such decay product from Uranium .When Radon decay it produces radioactive alpha particle. Alpha radiation have very low pennitrating power it cannot penetrate outer skin, however breathing in alpha particles is a concern as it directly enters lungs. Usually, radon occurs in the lowest levels of the buildings, basements, crawl spaces, of houses. But there are a few structures that have radon level in highest floor, this can be because of inefficient ventilation, and the material utilized. [6-8]

1.4. How does radon penetrate into atmosphere?

Radon moves by two ways: diffusion and forced flow. The migration due to diffusion in soil and rock is controlled by the extent of pores, connected porosity in soil and rock. Higher porosity enables more extensive diffusive transport. In soil the porosity is generally interconnected; yet in rocks this isn't really obvious. In rocks the porosity changes from cracks and pore free to highly cracked rocks which gave space for radon gas movement.. This in turn escapes to the atmosphere through these air spaces.

1.5. Techniques of radon monitoring [7-8]

Many techniques as well as instruments are available for the detection of radon concentration levels and its decay products. Each have their own pros and cons for different situations. Some are for long term exposure and some are for short term exposure known as passive and active methods to detect radon concentration .We have to decide that which technique we have to use according to the situations and conditions we have.

As radon is being a large contributor to the radiation dose delivered to mankind. Most of the exposures are mainly in the homes. So due to this reason, a large number of radon measurements are taking place from since past recent years.

Types of devices, it may be Active measurement where detectors like Scintillation counters, Ionization chambers and decay products collection by Electrostatic method. Another measurement method is Passive methods were detectors like Charcoal detectors, Electron detectors and Etched track detectors can be used.

In this present study, etched track detectors have been used. Detectors are composed of a plastic/ polycarbonate material, in which the tracks are impinge when it is exposed to alpha or any other type of radiation. Here samples get damaged while exposure and these exposure can be revealed later while etching the samples in the solution of NaOH. Mostly used detectors are LR-115(a thin film of colored cellulose nitrate on an inert backing), CR-39 (poly allyl diglycol carbonate, PADC) and Polycarbonate detectors.

2. Conclusion

Thus radon monitoring is required to access the concentration of harmful radiation in the environment basically air, soil and water. As radon inhalation is harmful for humans so its detection should be easy and affordable.

Track etching technique to measure radiation concentration by etching provides a simple and effective method of radon monitoring.

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