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Effects of Radon Gas on Human Health in some of Cosmetics

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Abstract

Radon is a naturally occurring radioactive gas found in soils everywhere. It is unique among radioactive elements because it is the only one that occurs as a gas. This permit motion up during the soils and cracks in rocks until the gas get-away into the atmosphere. In the atmosphere it is very dilute.The show study an overview of the evaluation of radon (^{222}Rn) activity concentration in in eight cosmetics samples from different origins in Hilla city/ Iraq by using alpha-emitters recordsthat emitted from radon gas in Durridge RAD-7 radon-in-airmonitor, using RAD-H_2O technique with closed loop aeration connotation. The value ranged between (1.43BqL^{-1}) for Blossom lotion sample and (1.45 BqL^{-1}) for Remove makeup, the rate reaches about (1.438BqL^{-1}).The present work all cosmetics samples were with lowest concentricity of radon gas than the allowed border from International Commission of Radiation protection (ICRP) agency.

Keywords: Radon concentration;Cosmetics; RAD-7; Hilla

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Introduction

^{222}Rn is part of the natural radioactivity chain which contributes more than 50%of the exposure from the natural radiation environment, It seems that radon has accepted the idea and implementation of globalization of the world by making available itself everywhere. Its existence is strongly tied with the presence of other elements. Surprisingly, it is the direct radioactive product of radium [1]. Radon invaderis by far the most significantt source of ionizing radiation between those that are of natural origin. Radon (^{222}Rn) is a noble gas established from radium (^{226}Ra), which is a decay produce of Uranium (^{238}U). Uranium and radium occur naturally in soils and rocks. Other decay products of uranium include the isotopes thoron (^{220}Rn) and actinon (^{219}Rn). Radon gas, which has a half-life of 3.8 days, emanates fromrocks and soils and tends to concentrate in enclosed spaces like under ground minesor houses. It is a prime contributor to the ionizin gradiation potion received by the generic population [2]. After its detection in 1900, radon was regarded as having therapeutic powers and was added to everything from tooth paste to hair cream. People were not aware of its deadly health hazard. The tie up between lung cancer and radon was first shown in the1950 in uranium miners, dangerous to high levels of the gas during their work [3]. The fundamental sources of radon and radon daughter in buildings are the soil adjacent to the building, potable water stock and building materials Radon in outdoors air might also enter a structure as the air is exchanged. This input is usually more than balanced by the loss of radon of the open air. Buildings materials generally contribute fairly little to the total indoor radon concentration, except when the radium content in it is above the normal values [4]. Where water is in direct contact with mineral particles that contain radium, radon can be implanted in water by alpha recoil. Radon gas is soluble in non-polar solvent but mildly soluble in cold water. If the radon concentration in air is about 3 Bq.m-3, the concentration in water will be 1.5 Bq.m^{-3} at 0°C [5]. Radon has three important isotopes. These are: (1) ^{222}Rn (Calledradon, belongs to ^{238}U decay series); (2) ^{220}Rn (Called thoron, belongs to ^{232}Th decay series); (3) ^{219}Rn (Called actinon, belongs to, ^{235}U decayseries). Scientifically, radon is known to be ^{222}Rn, the most abundantisotope of the element radon [6]. In the literature the terms radon and ^{222}Rn are often used interchangeably. This approach has been also adopted in the present work. ^{219}Rn has a relatively low abundance in theearth's crust, i.e. only about 0.7%, and has the shortest half life of ~ 4 seconds. So as to of its very short half-life, ^{219}Rn usually vanish soon after its production.

^{220}Rn is also not able to fly far (i.e., decays before reaching the earth's surface due to its-short half-life of 55.5 seconds), and can often be cast away from the control system by introducing filters or other delaying techniques.

The most important isotope of radon is ^{222}Rn, can transmit substantial distances from its point of origin. That is why only is generally considered as a health hazard when estimating risk factors from exposure to radon. There are no tubs for radon, and it is rated that only negligible quantities fleeing to the stratosphere [6]. As a result, the final and sole destiny of ^{222}Rn is transformation or dissolution through radioactive decay.

Physical and Chemical Properties of Radon

Radon is a colorless, odorless, tasteless, non-flammable and

α-radioactive gas. Therefore it can not be detected with human senses. Itsmelting point is -70℃ and boiling point is -60.8℃. Radon has thehighest gas density of ~ 9.96 kg.m^{-3} and is about seven times heavier thanair [7].

Experimental Method

The Durridge RAD7. Figure 1 is one type of continuous radonmonitors which uses a solid state alpha detector. The detector transform alpha radiation directly to an electric signal and has the possibility of locate electronically the energy of each particle, which permit the identification of the isotopes (^{218}Po, ^{214}Po) produced by radiation, so it is possible to outright distinguish between old and new radon, radon from thoron, andsignal from noise [8,9].

The RAD7-H_2O detector was used for mensuration radon in water by connecting it with a bubbling supply which authorise to degas radon from a cosmetics sample into the air in a closed loop. A sample of cosmetics was taken in a radon narrow reagent bottle of 250 mL sulphide coated detection compartment which acts as scintillator to detect alpha activity and a glass bulb containing calcium chloride to soak up the moisture. Air was then circulated in a closed circuit for a duration of 5-10 min until the radon was uniformly mingled with the air and the resulting alpha activity was on record and it directly gives the radon concentration [8,9].

Potential of 2000-2500 V, The pump will run for five min, aerating the sample and delivering the radon to the RAD7. The system will wait a further 5 min. It will then start counting After five min, it will print out a short-form report. The same thing will happen again five min later, and for two more five-minute periods after that. At the end of the run (30 min after the start), the RAD7 prints out a summary, showing the average radon reading from the four cycles counted a bar chart of the four readings, and a cumulative spectrum. The radon level is that of the water, and is calculated automatically by the RAD7. All data except the spectrum, is also stored in memory, and may be printed or downloaded to a PC at any time. In this mode the RAD7 check speedy responses to changing radon levels by centering on the 3 min 218Po alpha peak. Using the internal pump, the RAD7 draws air from the environment through the desiccant and inlet candidate into the measurement chamber [10].

The annual effective dose was deliberate using the formula [11].

$$E = K \times C_{Rn} \times KM \times t \quad (1)$$

Where: E is the effective dose from ingestion (Sv), K the ingesting potionconversion factor of ^{222}Rn (1×0-8 Sv/Bq for adults) [12]. CRn is the radon concentration in Bq/L, KM is the water consuming (2 L/day) t is the interval of consumption (365 d).

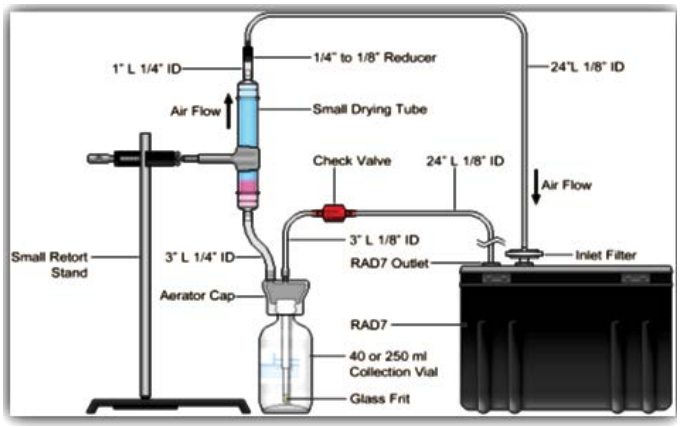

Figure 1: RAD H_2O Schematicres presentation [9].

Results and Discussion

In this study has been located the concentrations of radon gas for different models of imported cosmetics. Table 1 shows the measured concentrations of radon gas in the studied models.

In this action, we study the radon gas concentration in seven samples selected cosmetics from various origins used by women of Hilla city by using RAD7 detector. Table 1 shows the The results for radon concentration in in the studied sample. The radon concentration varies from (1.43 Bq.L^{-1}) for Blossom lotion sample to (1.45 Bq.L^{-1}) for The Balm Remover with an average value of (1.434 Bq.L^{-1}).). This is due to the variation in the values of the basis in the production of all the cosmetics that impact the radon concentration. The rated annual effective dose ranged from (10.43 μSv/y) to (10.58 μSv/y) are shown in the table, and as graphically clarify in figure (Table 1) (Figure 3).

Conclusion

In this study may be concluded that, radon concentration in the cosmetics samples that were collected from Hilla city markets, The average equals to (1.438 BqL^{-1}) and The average value of annual effective equals to (10. 5 μSv/y). The average of reading were lower than

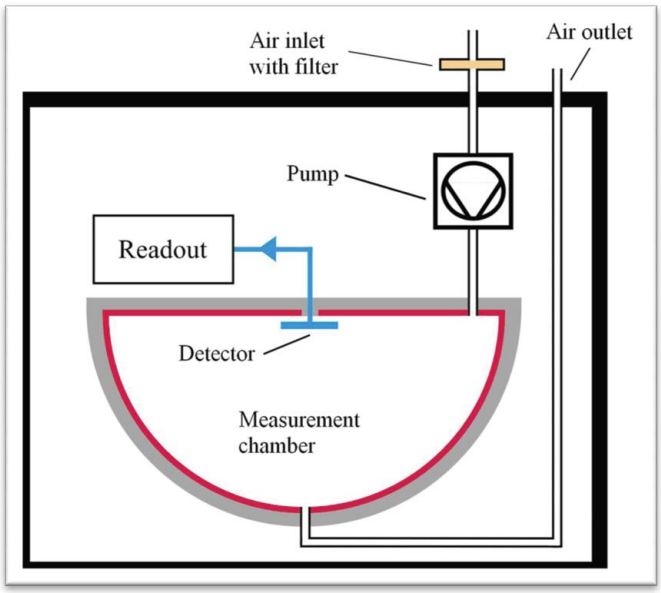

Figure 2: Measurement chamber of the RAD7 [8].

Table 1: The concentration of radon in the cosmetics studied models.

No. samples	Name sample	Made	C_R (Bq.L^{-1})	Annual effective dose (μSv/y)
1	3X Aloe Vera Attested	P.R.C	1.44	10.512
2	The Balm Remover	USA	1.45	10.585
3	Blossom lotion	U.A.E	1.43	10.439
4	Ever Beauty Attested	P.R.C	1.44	10.512
5	Refesking Rose Water	Thalland	1.44	10.585
6	*Sebamed Clear Face*	Germany	1.44	10.512
7	Clean and Clear Face	USA	1.43	10.439

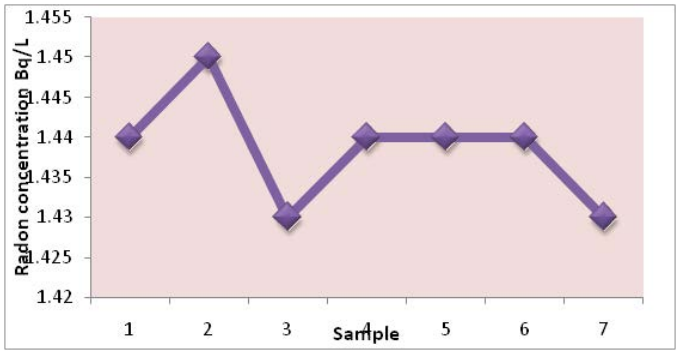

Figure 3: The concentration of radon gas for cosmetics samples.

the permissible limits recommended by ICRP and EPA [13]. Calculate data mention that imported cosmetics samples is safe without show significant radiological dengerous to women

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