COMBINED EFFECT OF FILTRATION AND UNIPOLAR AIR IONIZATION ON RADON PROGENY

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ABSTRACT

Unipolar air ionization has been used indoors mainly because of the claimed beneficial health effects. The biological and physiological importance of air ions is not generally accepted and it seems that air ionization has only minor, if any, direct effects on human beings. Unipolar ionization has, however, a clear effect on aerosol particles and — as been found out in recent studies — on radon decay products. Because of the attachement of radon daughters to aerosol particles the deposition of particles caused by the ionization results also in a decrease of the equilibrium factor. Depending on the ionization polarity also the unattached (electrically charged) daughters are removed to a great extent. These effects can be reinforced by mixing the air with a fan.

Air filtration has also been used to lower the radon progeny concentration. This reduces the attached fraction, which causes a decrease in the total equilibrium factor. As the amount of unattached daughters increases, the decrease in the dose is much smaller. Electrostatic precipitators commonly used for air filtration in dwellings can cause particle formation. This affects the radon progeny when no other particle sources are precent, because the free daughters are attached to these small particles.

This study is concentrated on the combined effect of filtration and unipolar ionization on radon progeny. This combination has several advantages:
-air cleaning minimizes the dirt accumulation on surfaces caused by ionization
-the charged fraction of free progeny is removed by ionization
-air mixing by filtration reinforces the effect of ionization.

Measurements made in a laboratory test room show that the combined effect of ionization and filtering is larger than from either of them alone. The difference of electrostatic precipitator and mechanical filter is studied by using two cleaners with identical flow rates. The effect caused by the particle formation by electrostatic precipitator is observed in clean air.