Radon and ions

The ionising effect of radon gas and its radioactive decomposition products result in an increase in the ion concentration in indoor air. The ability to determine the radon gas concentration by measurement of the ion concentration was examined by Mr. Bernd Haider from Windach. For this purpose, the 'equilibrium equivalents of radon concentration', internationally known as the 'Equilibrium Equivalent Radon Concentration', or 'EEC' for short, and the ion concentration in the indoor air were continually recorded for more than 19 days. The measurement values were stored hourly.
To measure the ion concentration the Ionometer IM5000, and for measurement of the EEC, the WLM plus (Working Level Monitor) measurement device from the Tracerlab company, Cologne, was used. The measurement values over time are shown in diagram 1 on the following page. The missing segments of the ion measurement values are defined by the storage method used for measured values. The correlation of EEC values and thus also the radon gas concentration with the ion concentration in the indoor air is clearly visible. Wolfgang Maes from Neuss, Germany, already conducted similar measurements some time ago and obtained the same results.
The radon gas concentration in living spaces is around twice as high as the equilibrium equivalents of radon concentration (EEC). In diagram 2 on the following page, the correlation between the two parameters is shown. The least square lines as defined by the measurement values facilitate conversion of the ion concentration measured with the ionometer into the equilibrium equivalent radon concentration (EEC) in accordance with the following equation:

$$EEC\left[Bq/m^3\right] = \frac{conzentration\left[Ions/cm^3\right]}{25} - 40$$

To determine the radon gas concentration in living spaces, the calculated EEC value shall then be multiplied again with factor 2. Important for this measurement is the exclusion of artificial ion sources, such as open flame, spraying water or technical ionisation devices.

Example: In a living space, the ionometer shows a measurement value of 3600 ions/cm³ in the indoor air. No artificial ion sources are present. Based on the above equation, an EEC value of 104 Bq/m³ is obtained and for a normal living space, accordingly a radon gas concentration exceeding 200 Bq/m³ could be presumed.

This investigation illustrates an additional interesting field of application for our ionometer. The high responsiveness of this device means a statement over the current circumstances of the radon gas concentration in living spaces is possible.

Continued: **Radon and ions**

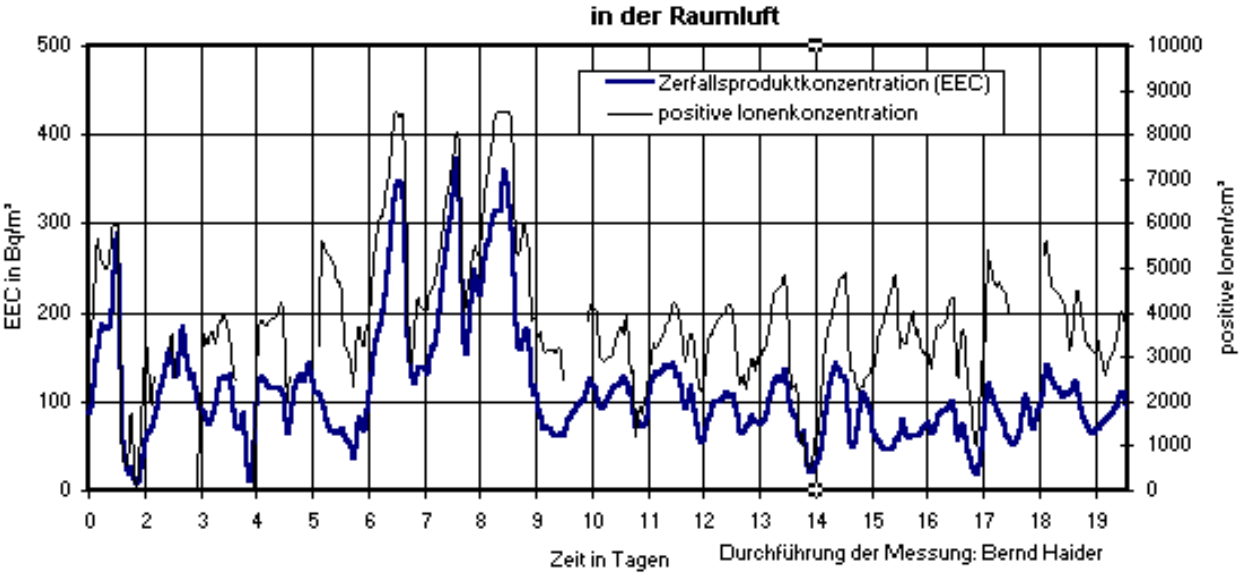

Diagram 1

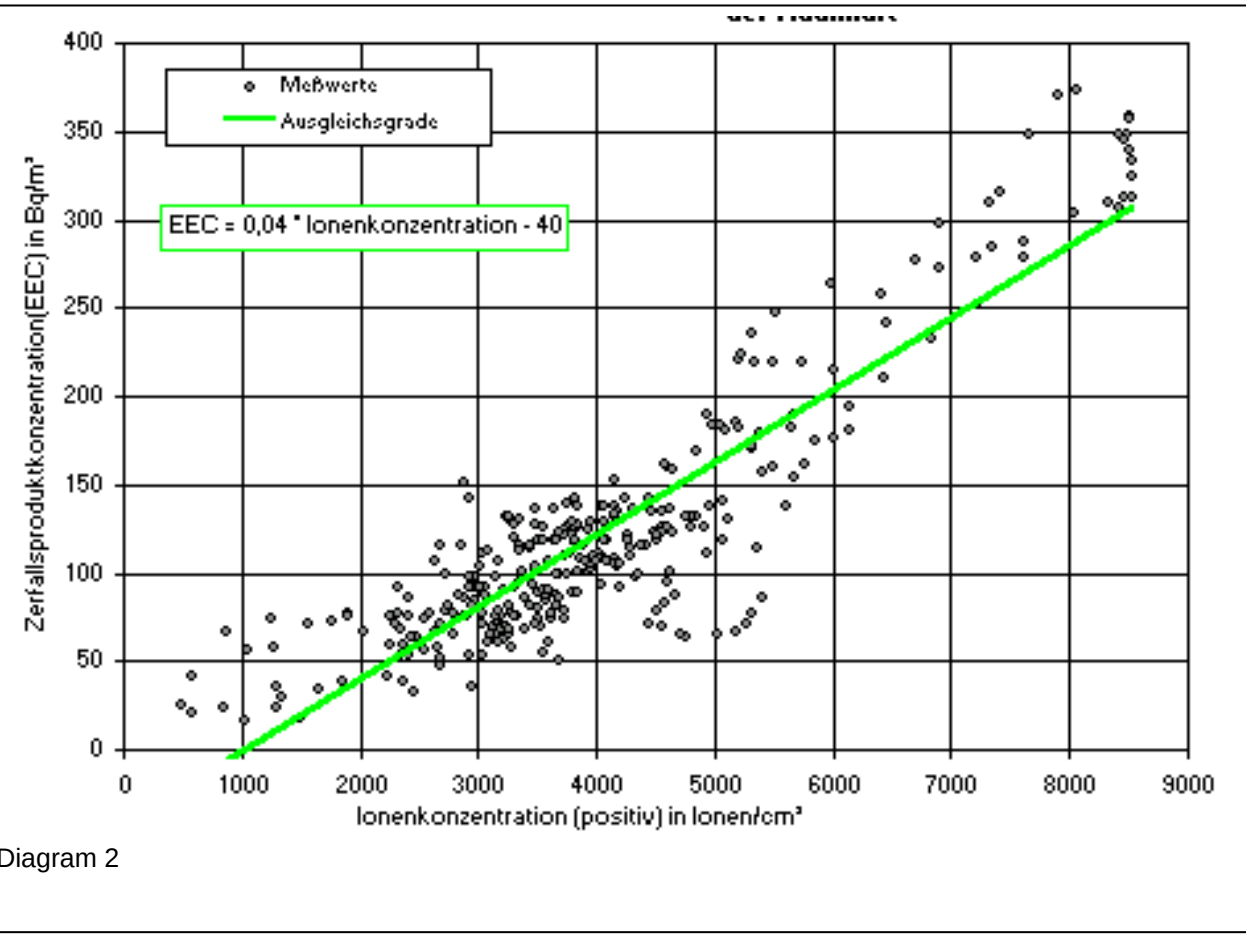

Diagram 2