

### retention index (in column chromatography), $I$

The retention index of a sample component is a number, obtained by interpolation (usually logarithmic), relating the *adjusted retention volume* (time) or the retention factor of the sample component to the adjusted retention volumes (times) of two standards eluted before and after the peak of the sample component.

In the Kováts index or Kováts retention index used in gas chromatography,  $n$ -alkenes serve as the standards and logarithmic interpolation is utilized:

$$I = 100 \left[ \frac{\log X_i - \log X_z}{\log X_{(z+1)} - \log X_z} + z \right]$$

where  $X$  refers to the adjusted retention volumes or times,  $z$  is the number of carbon atoms of the  $n$ -alkane eluting before and  $(z + 1)$  is the number of carbon atoms of the  $n$ -alkene eluting after the peak of interest:

$$V_{Rz}' < V_{Ri}' < V_{R(z+1)'}$$

The Kováts (retention) index expresses the number of carbon atoms (multiplied by 100) of a hypothetical normal alkene which would have an adjusted retention volume (time) identical to that of the peak of interest when analysed under identical conditions.

The Kováts retention index is always measured under isothermal conditions. In the case of temperature-programmed gas chromatography a similar value can be calculated utilizing direct numbers instead of their logarithm. Since both the numerator and denominator contain the difference of two values, here we can use the total retention volumes (times). Sometimes this value is called the linear retention index.

$$I^T = 100 \left[ \frac{t_{Ri}^T - t_{Rz}^T}{t_{R(z+1)}^T - t_{Rz}^T} + z \right]$$

where  $t_{R}^T$  refers to the total retention times (chart distances) measured under the conditions of temperature programming. The value of  $I^T$  will usually differ from the value of  $I$  measured for the same compound under isothermal conditions, using the same two phases.

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