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retention volumes

Also contains definition of: adjusted retention volume *in chromatography*

in chromatography

Retention measurements (and measurements of hold-up volume and peak width) may be made in terms of times or chart distances as well as volumes. If flow and recorder speeds are constant, the volumes are directly proportional to the times and chart distances. The following definitions are drawn up in terms of volume, and it is recommended that theoretical discussion should be couched in the same terms wherever possible. The total retention volume, V_R, is the volume of eluent carrier gas admitted to the column between the injection of the sample and the emergence of the peak maximum of the specified component. It includes the hold-up volume. In gas chromatography, the volume of carrier gas is specified at the outlet pressure and temperature of the column. Note: the word 'total' in this definition allows retention time to be used as a general term when specification of a particular quantity is not required. The adjusted retention volume, V_R', is the total retention volume less the hold-up volume, V_M, i.e.

$$V_R' = V_R - V_M = \bar{V} - V_I$$

where $\bar{V}$ is the peak elution volume and V_I the interstitial volume. The net retention volume, V_N, is the adjusted retention volume multiplied by the pressure-gradient correction factor:

$$V_N = j\, V_R'$$

The specific retention volume, V_g, is the net retention volume per gram of stationary liquid, active solid or solvent-free gel. In liquid chromatography, except when conducted at very high pressures, the compression of the mobile phase is negligible, and the adjusted and net retention volumes are identical. The specific retention volume is then the adjusted retention volume per gram of stationary liquid, active solid, or solvent-free gel. It is recommended that, when appropriate, authors specify the drying conditions. At 0 °C,

$$V_g = 273\, \frac{V_N}{w_L\, T}$$

where w_L is the mass of the stationary liquid phase.

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Source:
Orange Book, p. 103
Orange Book, p. 104

See also:
PAC, 1993, *65*, 819 *(Nomenclature for chromatography (IUPAC Recommendations 1993))* on page 841

