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ProductInformation

RETENTION INDEX STANDARD
For Gas Chromatography

SIGMA TECHNICAL BULLETIN #R8769
Product No. **R 8769**

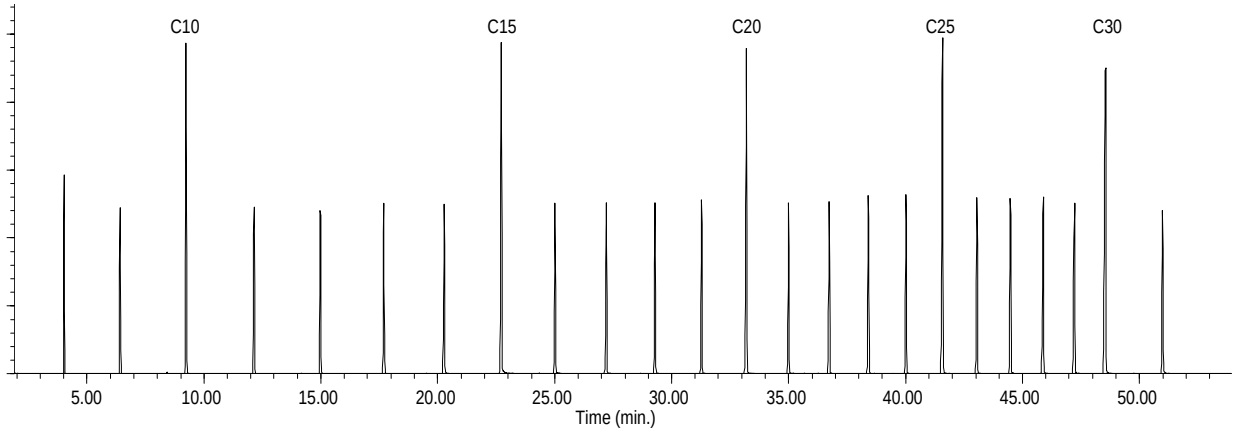
Description:

Sigma Retention Index Standard consists of a mixture of aliphatic hydrocarbons ranging from C8 through C32, dissolved in hexane. It is designed to be used to obtain Kovats-type gas chromatographic retention indices, which are useful for preliminary identification of unknowns and as an aid in GC method development. Components with carbon numbers that are a multiple of five are at 2X concentration to allow easy determination of carbon numbers for peaks of interest.

Composition:

All components used are 98+% pure and are dissolved in GC grade Hexane at the nominal concentrations listed below:

Component	µg/mL	Component	µg/mL	Component	µg/mL
n-Octane (C8)	1000	n-Hexadecane (C16)	1000	n-Tetracosane (C24)	1000
n-Nonane (C9)	1000	n-Heptadecane (C17)	1000	n-Pentacosane (C25)	2000
n-Decane (C10)	2000	n-Octadecane (C18)	1000	n-Hexacosane (C26)	1000
n-Undecane (C11)	1000	n-Nonadecane (C19)	1000	n-Heptacosane (C27)	1000
n-Dodecane (C12)	1000	n-Eicosane (C20)	2000	n-Octacosane (C28)	1000
n-Tridecane (C13)	1000	n-Heneicosane (C21)	1000	n-Nonacosane (C29)	1000
n-Tetradecane (C14)	1000	n-Docosane (C22)	1000	n-Triacontane (C30)	2000
n-Pentadecane (C15)	2000	n-Tricosane (C23)	1000	n-Dotriacontane (C32)	1000



Typical Temperature Programmed Chromatogram
Column 15m x 0.20mm x 0.2 µm Supelco SPB-1 (Cat. No. 2-4162)
Oven Temperature 30°C (0 min.), then 5°/min. to 300°C

Calculations:

A retention index value may be calculated for a peak by comparing its retention characteristics to those of the two closest eluting components in the RETENTION INDEX STANDARD, analyzed under identical conditions, using equations such as those found below.[1-2] Presumptive identifications can often be made by comparing the Retention Index value to a value previously determined by you or values published in various literature references.[3-7]

$$I = 100\left[z + \frac{\log t'_{Ri} - \log t'_{Rz}}{\log t'_{(z+1)} - \log t'_{Rz}} \right] \qquad I^T = 100\left[\frac{t^T_{Ri} - t^T_{Rz}}{t^T_{R(z+1)} - t^T_{Rz}} + z \right]$$

where: I = retention index for isothermal GC analysis

I^T = retention index for temperature programmed GC analysis, constant heating rate

t'_{Ri} = adjusted retention time of sample peak*

t'_{Rz} = adjusted retention time of n-alkane peak eluting immediately before sample peak*

$t'_{R(z+1)}$ = adjusted retention time of n-alkane peak eluting immediately after sample peak*

z = carbon number of n-alkane peak eluting immediately before sample peak

t^T_{Ri} = retention time of sample peak

t^T_{Rz} = retention time of n-alkane peak eluting immediately before sample peak

$t^T_{R(z+1)}$ = retention time of n-alkane peak eluting immediately after sample peak

*__Note__: adjusted retention time = peak retention time minus retention time of an unretained peak

Examples:

Isothermal analysis

Sample peak = 2.55 min. Unretained peak (air, methane, etc.) = 0.70 min.
C18 peak = 2.16 min. C19 peak = 2.81 min.

$$I = 100\left[18 + \frac{\log(2.55 - 0.70) - \log(2.16 - 0.70)}{\log(2.81 - 0.70) - \log(2.16 - 0.70)} \right] = 1864$$

Temperature programmed analysis

$$I^T = 100\left[\frac{12.60 - 12.25}{12.93 - 12.25} + 18 \right] = 1851$$

Sample peak = 12.60 min.
C18 peak = 12.25 min. C19 peak = 12.93 min.

References:

1) *Basic Relationships of Gas Chromatography*, Advanstar, Cleveland, 1993
2) *Journal of Chromatography* A, 657 (1993) 1-15
3) *Journal of Chromatographic Science*, Vol. 19, May, 1981, 219-226
4) *The Sadtler Standard Gas Chromatography Retention Index Library*, Sadtler Laboratories, Philadelphia, 1984
5) *Journal of Chromatography*, 113 (1975) 69-95
6) *Instrumental Data for Drug Analysis*, 2nd ed., Vol. 1-5, Elsevier Science Publishing, New York
7) *Clarke's Isolation and Identification of Drugs*, 2nd ed., The Pharmaceutical Press, London, 1986

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