GAS-SOLID CHROMATOGRAPHY

GSC is based on adsorption of gaseous substances on solid surfaces. Distribution constants are generally much larger than those for GLC. As a result. GSC is useful for the separation of species that are not retained by gas-liquid columns, such as the components of air, hydrogen sulfide, carbon disulfide, nitrogen oxides, carbon monoxide, carbon dioxide, and the rare gases.

GSC is performed with both packed and open tubular columns. For the latter, a thin layer of the adsorbent is affixed to the inner walls of the capillary. Such columns are sometimes called porous-layer open tubular, or PLOT, columns.

Two types of adsorbents are encountered, molecular sieves and porous polymers.

Retention index

Retention Index is a measure of the retention of a solute relative to the retention of normal alkanes (straight chain hydrocarbons) at a given temperature. The retention index for a normal alkane is its number of carbons multiplied by 100. For example, n-dodecane (n-$C_{12}H_{26}$) has I = 1200. If a solute has I = 1478 it elutes after n-C_{14} and before n-C_{15}, and it is closer to n-C_{15}. Retention indices normalize instrument variables so that retention data can be compared on different GC

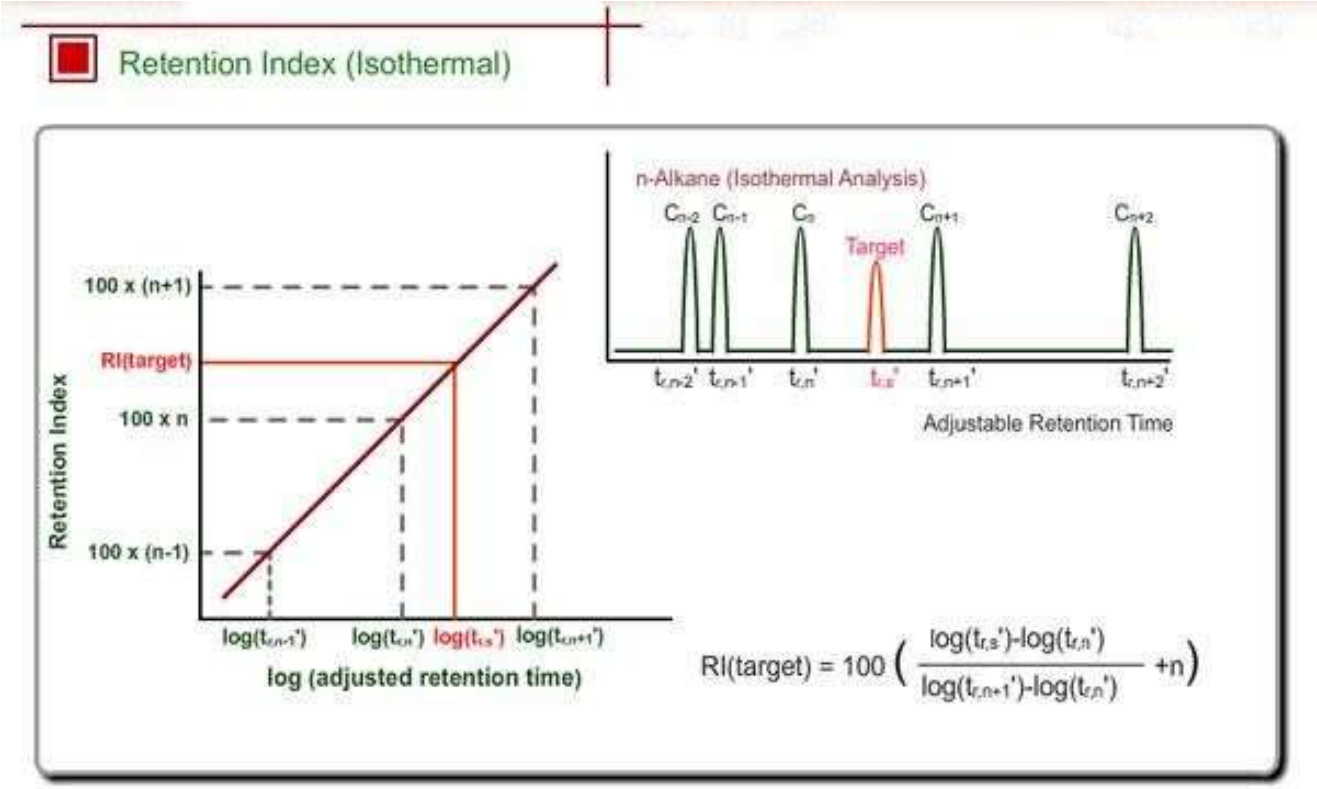
systems. Retention indices are also good for comparing retention characteristics for different columns.

In gas chromatography, **Kovats retention index** (shorter **Kovats index**, **retention index**; plural **retention indices**) is used to convert retention times into system-independent constants. The index is named after the Hungarian-born Swiss chemist Ervin Kováts, who outlined this concept during the 1950s while performing research into the composition of the essential oils.

The retention index of a certain chemical compound is its retention time normalised to the retention times of adjacently eluting n-alkanes. While retention times vary with the individual chromatographic system (e.g. with regards to column length, film thickness, diameter, carrier gas velocity and pressure, and void time), the derived retention indices are quite independent of these parameters and allow comparing values measured by different analytical laboratories under varying conditions. Tables of retention indices can help identify components by comparing experimentally found retention indices with known values.

Retention Index (Isothermal)

If a logarithm of adjusted retention times or relative retentions of n-alkanes is plotted with carbon numbers for isothermal analysis, they will show linear relation. Adding a logarithm of adjusted retention time of an unknown to the above～ mentioned graph indicates how many carbon numbers this compound corresponds to. In general, 100 times of a carbon number is defined as the retention index.



Linear Retention Index (LRI)

On the other hand, the peaks of n-alkane appear at even intervals for temperature programming analysis. We call retention index obtained by temperature programming analysis linear retention index (LRI). LRI has advantageous points over retention index when using isothermal analysis. Calculation of retention index is simple, because logarithmic calculation is unnecessary. Absolute retention times are sufficient for calculating the retention index.