

Adjusted retention time hold up time - Primer

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What Is Adjusted Retention Time and Hold-Up Time in HPLC?

When learning chromatography, it's important to understand the concept of **hold-up time**—a key part of interpreting retention data.

Hold-Up Time (t_m)

Hold-up time (also called **dead time**) is the time it takes for a **non-retained compound**—usually a very small molecule that **does not interact** with the stationary phase—to pass through the column and reach the detector.

Think of it as the **minimum time** anything can take to travel through the column, carried only by the mobile phase.

Adjusted Retention Time (t_r')

To better understand how long a compound is actually retained due to interactions with the stationary phase, we use **adjusted retention time**:

$$[t_R' = t_R - t_m]$$

Where:

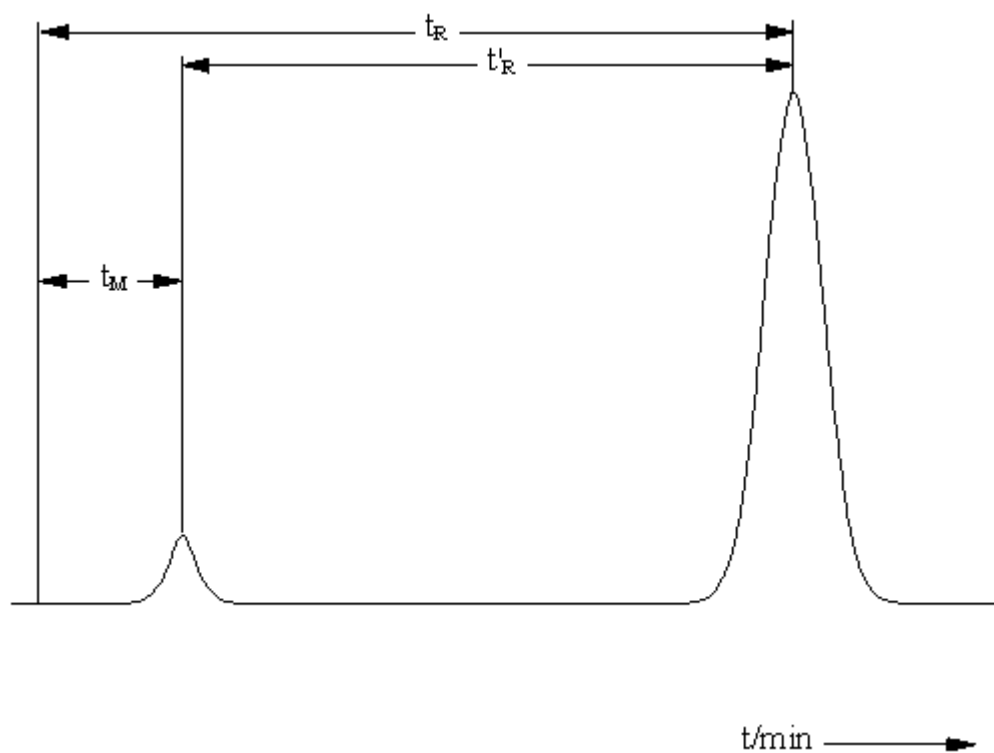
- t_R = observed retention time of the analyte
- t_m = hold-up time (non-retained compound)

This adjustment removes the baseline travel time and gives a clearer picture of how strongly the analyte interacts with the stationary phase.

Tip for Beginners: If a compound's retention time equals the hold-up time, it means it wasn't retained—it just flowed straight through.

Would you like a simple diagram or visual to go along with this explanation? It could help illustrate the concept for training or onboarding materials.

In the chart below, t_R is the retention time and t_m is the hold-up time.



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