

### 9.2.6.1 The Column

#### **Interparticle Volume of the Column ( $V_o$ )**

The volume of the mobile phase in the interstices between the gel particles. It is also called the *Interstitial Volume* of the column.

In exclusion chromatography, the interparticle volume of the column is equal to the retention volume of an unretained compound; however, it is *not* equal to the mobile phase holdup volume ( $V_i$ ; see *Total Mobile-Phase Volume in Column*). The reason for this is that in practice the mobile phase molecules are always smaller than the smallest pores of the column packing. Thus, they will enter all the pores available in the packing and therefore, will be eluted last. As a contrast, in general liquid chromatography, the mobile-phase hold-up volume (see *Hold-Up Volume (Time)*) and the retention volume of a non-retained compound are practically equal.

#### **Intraparticle Volume of the Column ( $V_i$ )**

The volume of the mobile phase within the pores of the gel particles. It is also called the *Intrastitial Volume* of the column or the *Stationary Mobile-Phase Volume*.

The retention time equivalent to  $V_i$  is  $t_i$ :

$$t_i = V_i / F_c$$

#### **Total Mobile-Phase Volume in Column ( $V_t$ )**

The sum of the interparticle and intraparticle volumes:

$$V_t = V_o + V_i$$

In the definition of  $V_t$  the *Extra-Column Volume* of the system ( $V_{\text{ext}}$ ) is neglected. If it is not negligible, it must also be added:

$$V_t = V_o + V_i + V_{\text{ext}}$$