

## Calculate Ligand Density of a Bonded Phase of an HPLC Column - Tech Information

Date: 14-APRIL2020 Last Updated: 11-OCTOBER-2025

### Calculating Ligand Density for Cogent Columns

Ligand density is a key parameter that reflects how much bonded phase is present on the surface of the silica in an HPLC column. For Cogent columns, we calculate ligand density using the Berendsen-de Galan equation:

$$\alpha = \frac{106 \times \%C}{(102 \times MW_{\text{carbon}} \times n_C - \%C \times MW_{\text{ligand}}) \times S_{\text{BET}}}$$

$$\alpha = (102 \times MW_{\text{carbon}} \times n_C - \%C \times MW_{\text{ligand}}) \times S_{\text{BET}} 106 \times \%C$$

Where:  $\alpha$  = Ligand density ( $\mu\text{mol}/\text{m}^2$ )

- **%C** = Percent carbon content of the bonded phase
- **MW<sub>(carbon)</sub>** = Molecular weight of carbon (12.01 g/mol)
- **n<sub>C</sub>** = Number of carbon atoms in the bonded ligand
- **MW<sub>(ligand)</sub>** = Molecular weight of the bonded ligand (g/mol)
- **SBET** = Specific surface area of the silica ( $\text{m}^2/\text{g}$ )

This equation accounts for the carbon contribution from the ligand and the silica surface area to estimate how densely the ligand is bonded.

#### Example:

Using this method, the **Cogent UDC-Cholesterol™** stationary phase has a calculated ligand density of approximately **1.5  $\mu\text{mol}/\text{m}^2$** , indicating a well-covered and stable bonded phase.

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