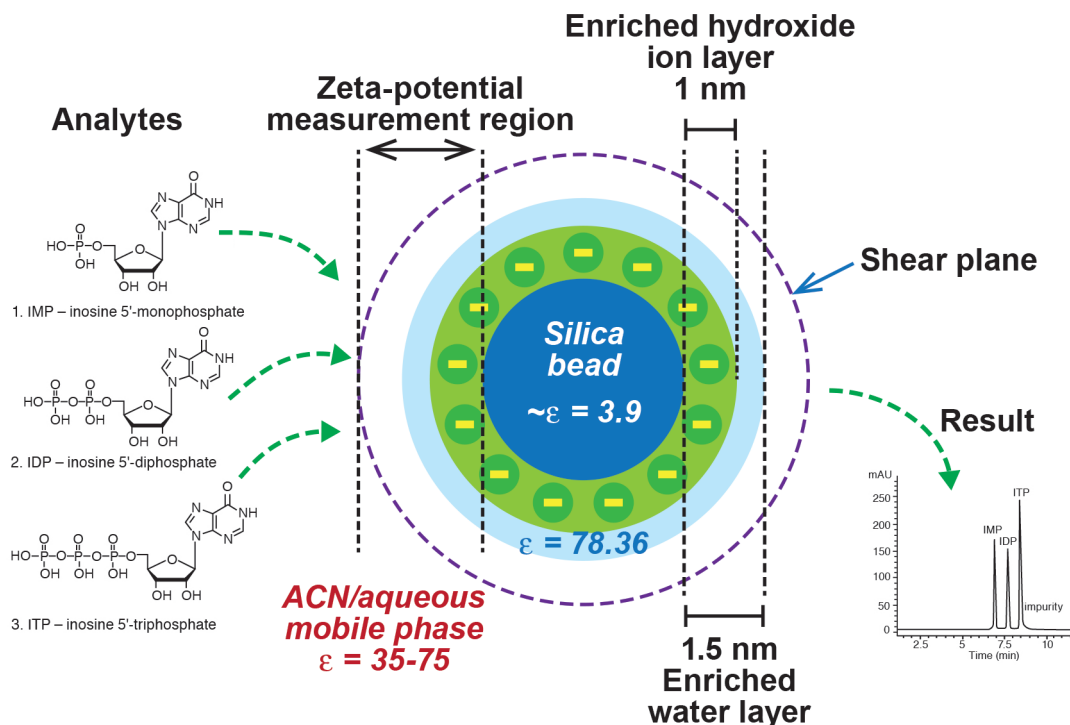


ANP Mechanism¹

The precise mechanism of ANP retention is an active area of investigation as of the publication of this catalog. However, a recent study involving zeta potential measurements to help characterize the surface has demonstrated that the water layer on a silica-hydride surface is, on average, only 0.5 of a monolayer, in contrast to 7-8 monolayers for ordinary Type B silica. This low amount of water on the surface precludes a partitioning process.

In addition, it has been determined that the TYPE-C silica surface possesses a negative charge. Instead of this charge being the result of surface silanols, as is the case for the ordinary unbonded silica used for HILIC methods, it has been ascribed to the presence of excess hydroxide ions adsorbed on the surface, derived from the aqueous component of the mobile phase (see Figure 5). Hydroxide ions from the surrounding liquid accumulate on the slightly hydrophobic silica-hydride surface. The mechanism of ANP is therefore thought to be a combination of ion attraction for positively charged species or ion displacement for negatively charged compounds. For polar neutral compounds a displacement/adsorption effect for retention is most likely.

Figure 5.



ANP vs HILIC

Cogent TYPE-C silica columns perform similarly to HILIC (Hydrophilic Interaction Liquid Chromatography) columns in that they both show increased retention times for polar compounds (when using > 70% organic composition of the mobile phase) compared to reversed-phase HPLC. Both column types perform separations that are based on variations of normal-phase, but they each have different retention mechanisms and various other different properties.

HILIC stationary phases are typically more polar than TYPE-C silica bonded phases, which are relatively non-polar.

On HILIC columns, retention of polar compounds is achieved by partitioning in and out of the adsorbed water layer surrounding the stationary phase surface. As the acetonitrile concentration increases, the water layer decreases and the charged polar analytes are retained by a combination of cation-exchange with the silanols under the water layer and the partitioning effect.

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