# The Relationship between Structural Properties of Metal-Tris (Ethylenediamine) Montmorillonite and their Behavior as Gas Chromatographic Packing Materials

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**Abstract:** The tris(ethylenediamine) complex cations of chromium(III), cobalt(III), and copper(II) were exchanged onto sodium montmorillonite. The resulting cation exchanged clays were dried, ground, sieved and the 50/80 mesh size was retained for use as column packing material to be used in gas chromatographic analysis of light hydrocarbons and oxides of nitrogen. Studies indicated that the hydrocarbons were following a sieving action whereas the nitrogen oxides were involved in a surface adsorption process.

The changes in $d_{001}$-spacing and surface area of tris(ethylenediamine)Cr(III)-montmorillonite were correlated with the changes in gas chromatographic retention time for the light hydrocarbons and the oxides of nitrogen.

Retention time was obtained for the 100 per cent exchanged montmorillonites containing cations of tris(ethylenediamine)Cr(III), tris(ethylenediamine)Co(III), and tris(ethylenediamine)Cu(II). A comparative study of the $d_{001}$-spacing and surface area of the three clays is shown to be directly related to the retention time.

Heating effects were studied to determine thermal stability. Changes in retention times were compared with various structural changes. DTA and heating-oscillating X-ray powder diffraction analysis were used to help explain the relationship between retention time and structural change.

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