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New DHA-DHAX Methods Using Hydrogen

A report (A New DHA (above ambient start) Method, 01/12/2000) was issued describing the conditions for an optimum method for the analysis of gasoline range petroleum samples. That method employed helium carrier gas, while this current work provides optimized DHA and DHAX methods using hydrogen carrier gas.

A new J&W DB-Petro 100m x 0.25mm ID, 0.5 μ m polydimethylsiloxane liquid phase, was previously setup with a 3.5m x 0.25mm 1.0 DB-5 precolumn as prescribed for the DHAX method, and was reported earlier showing excellent conformity to the DHAX method. Hydrogen carrier gas flow rate was studied to establish the optimum practical flow rate for obtaining the required component separations. It was found that a pressure of **40psig** giving a measured column outlet flow rate of **4.6 cm³/min.** was the maximum usable without significant loss of column efficiency. Since the analyses were faster than when using helium, the column oven temperature profiles has to be re-established. The oven temperature program was established at:

DHA Method

7.5 min. @ 30°C to 48°C @ 14.0°/min. & 25 min. @ 48°C to 200°C @ 2.7°/min.

DHAX Method

5.0 min. @ 5°C to 50°C @ 7.6°/min. & 33 min. @ 50°C to 200°C @ 2.7°/min.

The sample used for this evaluation is a synthetic gasoline, blended with various gasoline feed stocks and other added components, called PONA-VI, available from Transition Labs.**

****update 11/23/2010: PONA-VI is currently available through Restek**

Results

The DHA analysis is shown by the attached Figures One through Eight, while the DHAX analysis is shown in Figures Nine through Sixteen. The chromatograms are divided into normal hydrocarbon to normal hydrocarbon segments for convenience and since the method uses retention indices for identification purposes.

Original DHAX through C₁₄ using Helium @ 43psig: 175 minutes.

New DHAX through C₁₄ using Helium @ 66psig: 125 minutes.

New DHAX through C₁₄ using Hydrogen @ 40psig: 88 minutes.



Figure One – DHA Method from C₁ to C₅ Segment

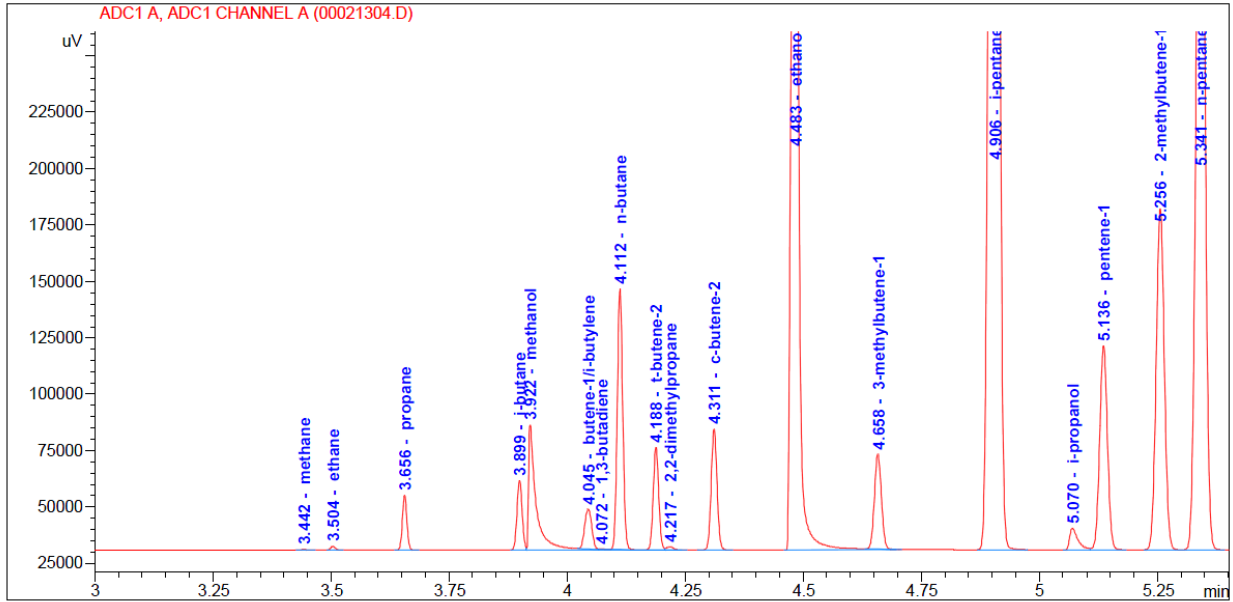


Figure Two – DHA Method from C₅ to C₆ Segment

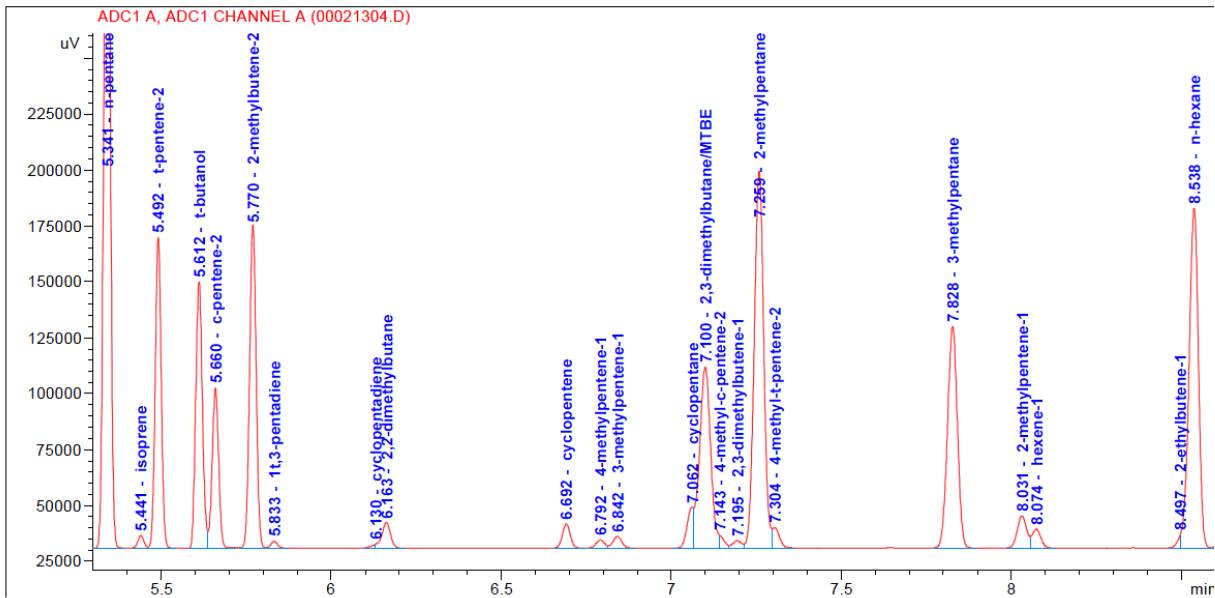


Figure Three – DHA Method from C₆ to C₇ Segment

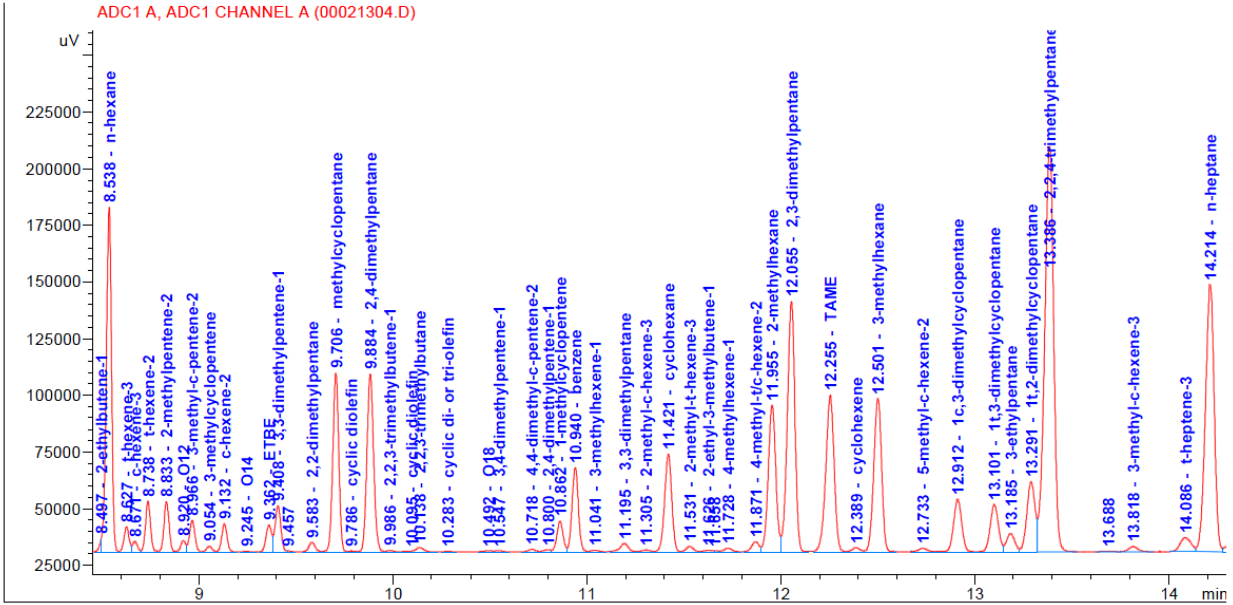


Figure Four – DHA Method from C₇ to C₈ Segment

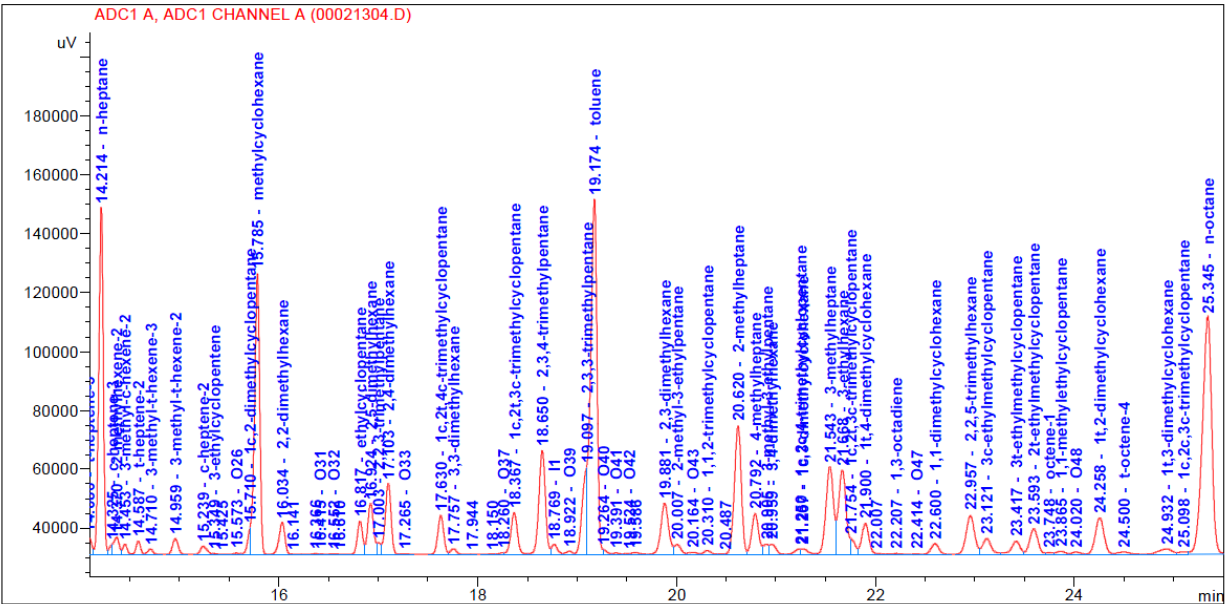


Figure Five – DHA Method from C₈ to C₉ Segment

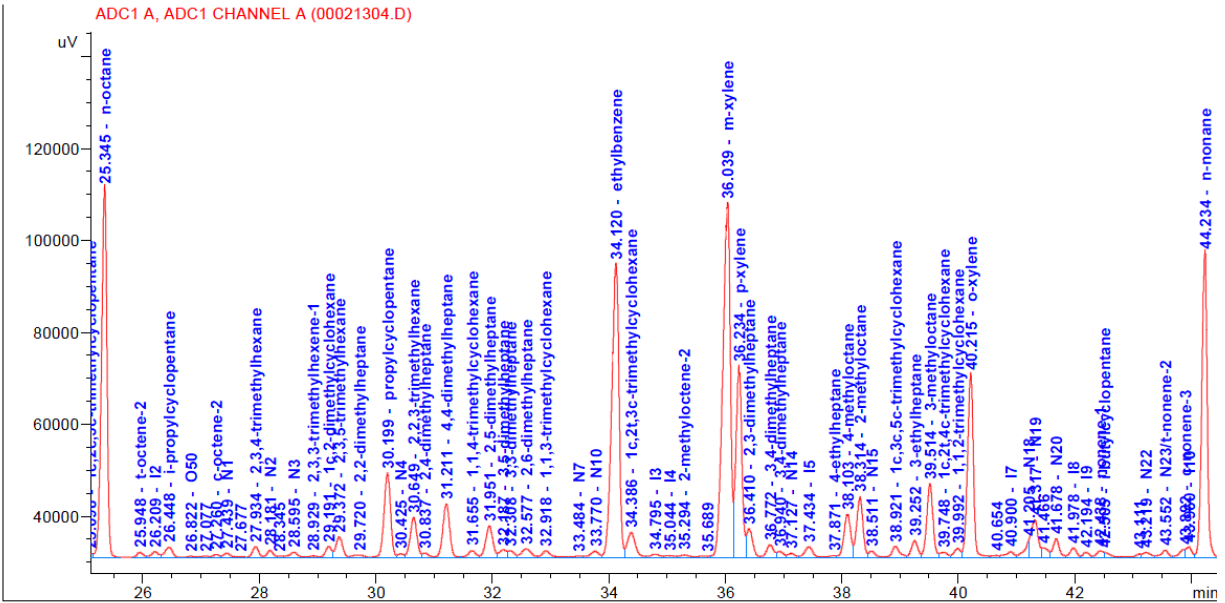


Figure Six – DHA Method from C₉ to C₁₀ Segment

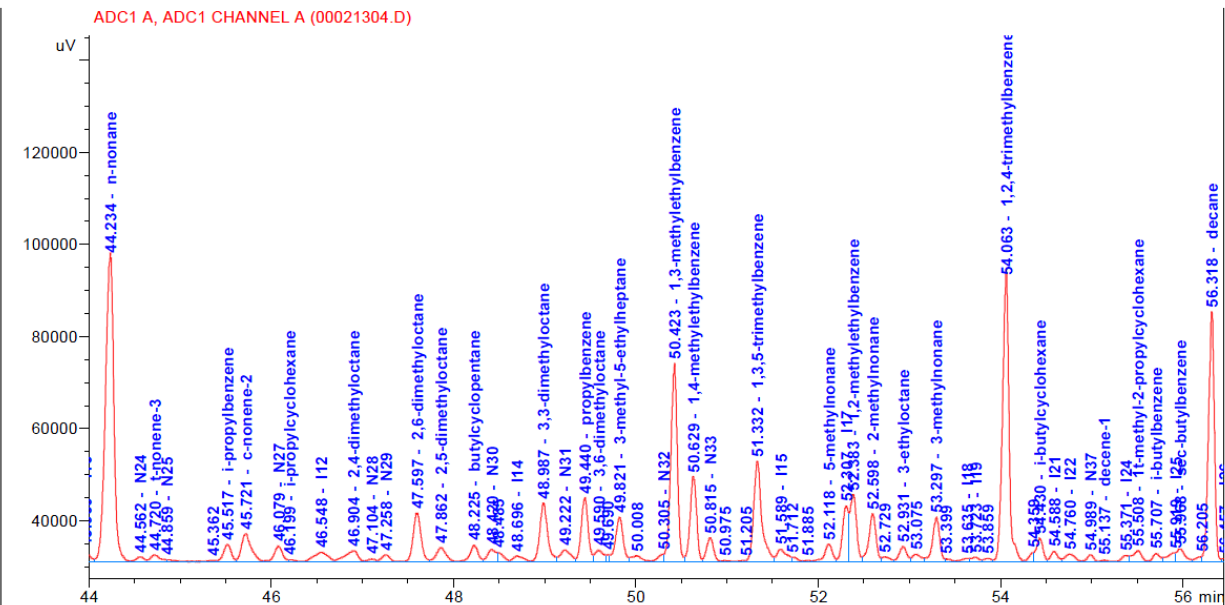


Figure Seven – DHA Method from C₁₀ to C₁₁ Segment

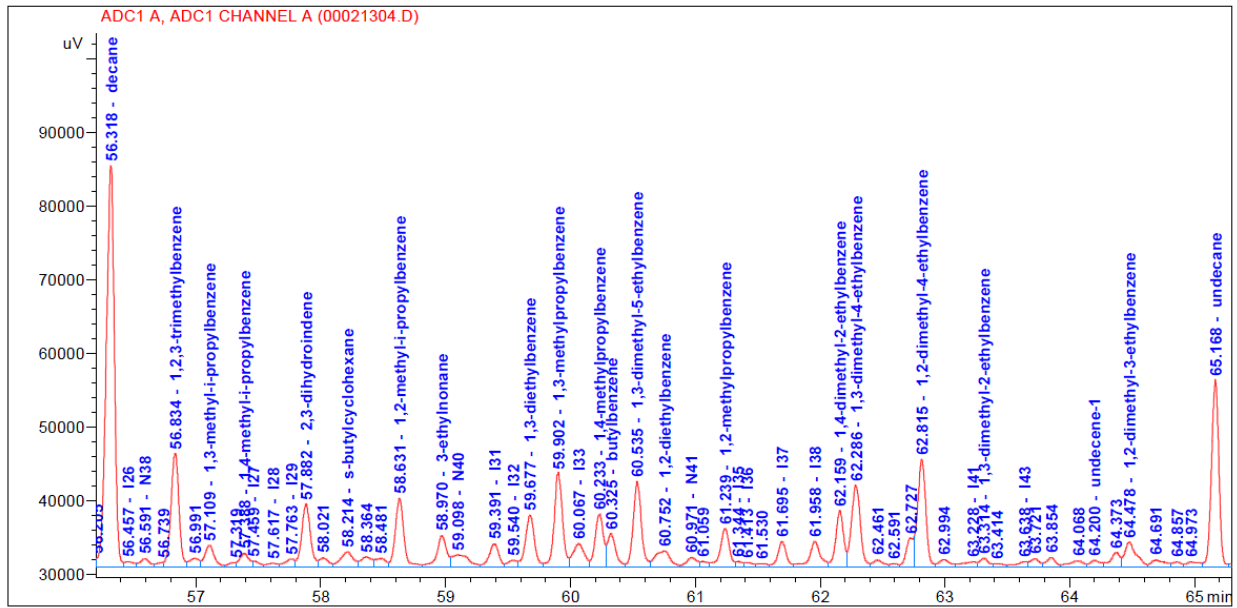


Figure Eight – DHA Method from C₁₁ to C₁₄ Segment

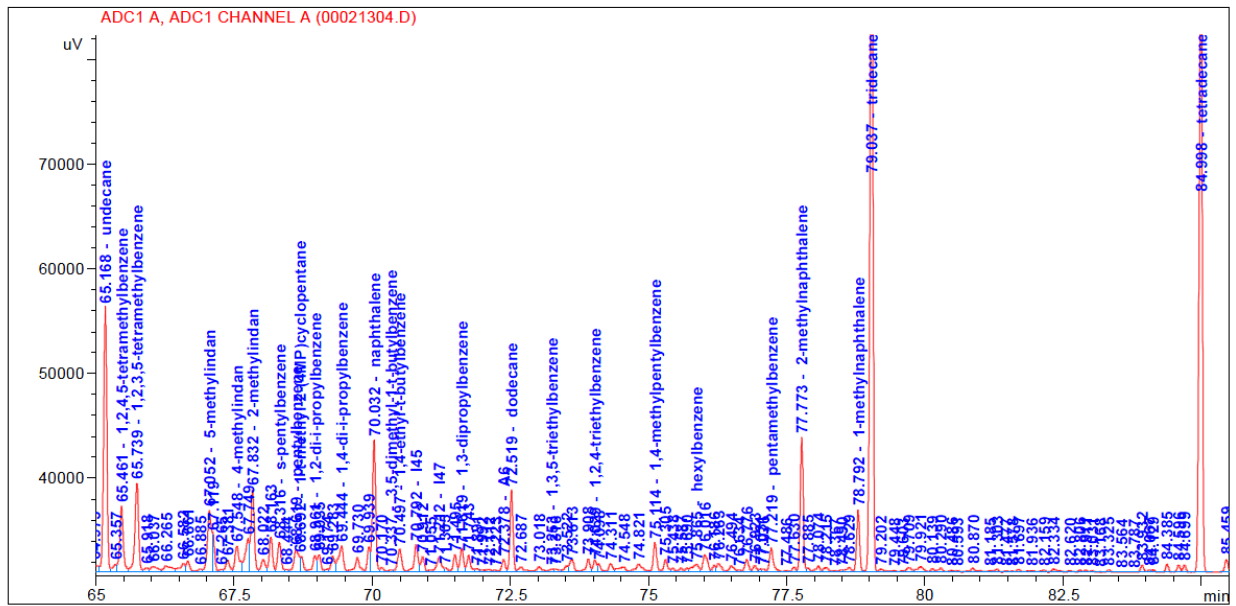


Figure Nine – DHAX Method from C₁ to C₅ Segment

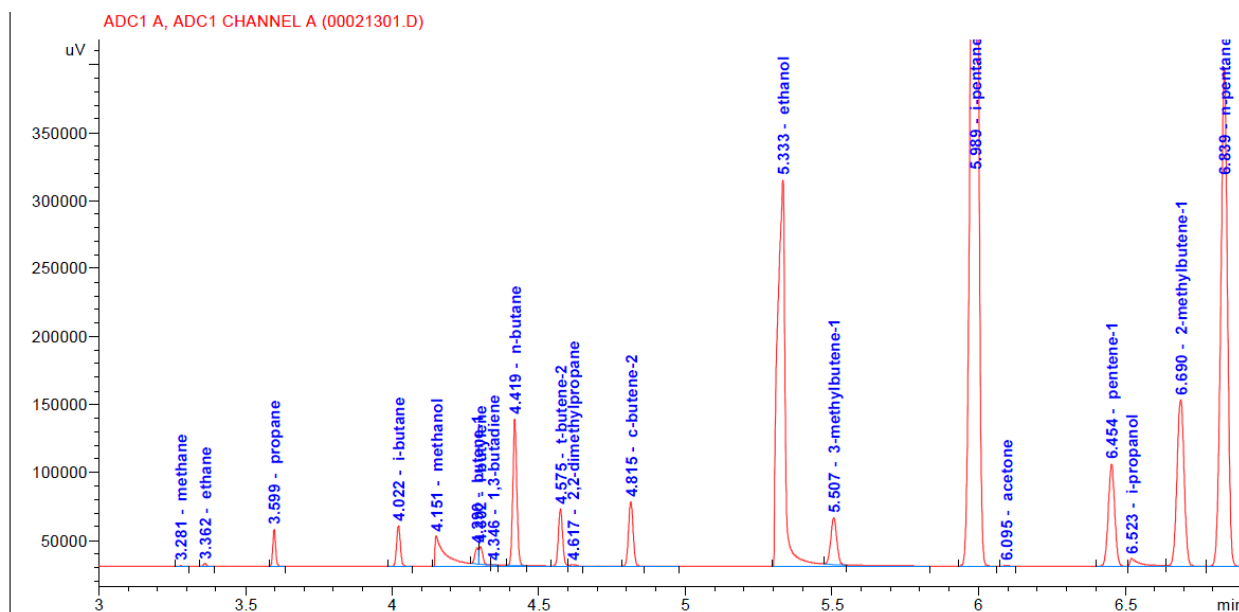


Figure Ten – DHAX Method from C₅ to C₆ Segment

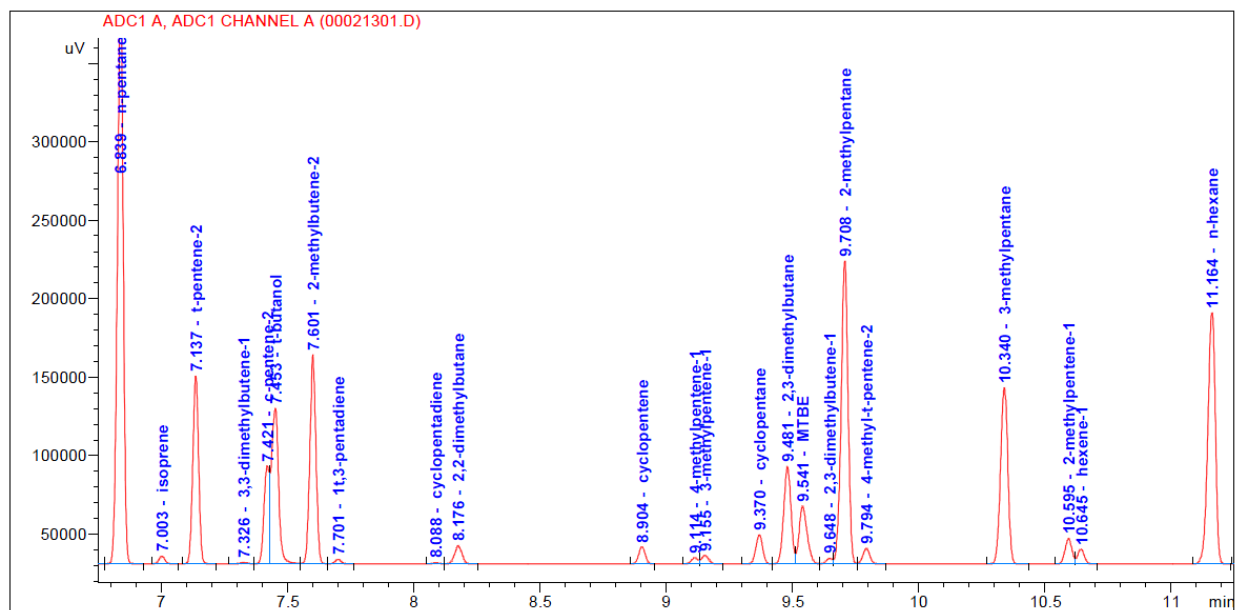


Figure Eleven – DHAX Method from C₆ to C₇ Segment

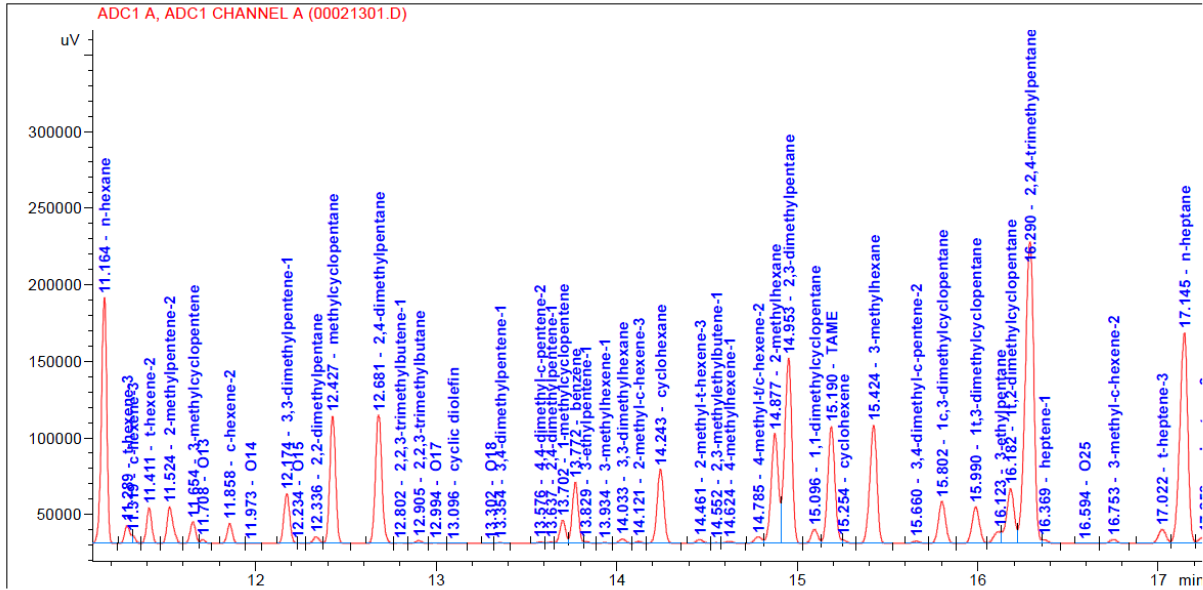


Figure Twelve – DHAX Method from C₇ to C₈ Segment

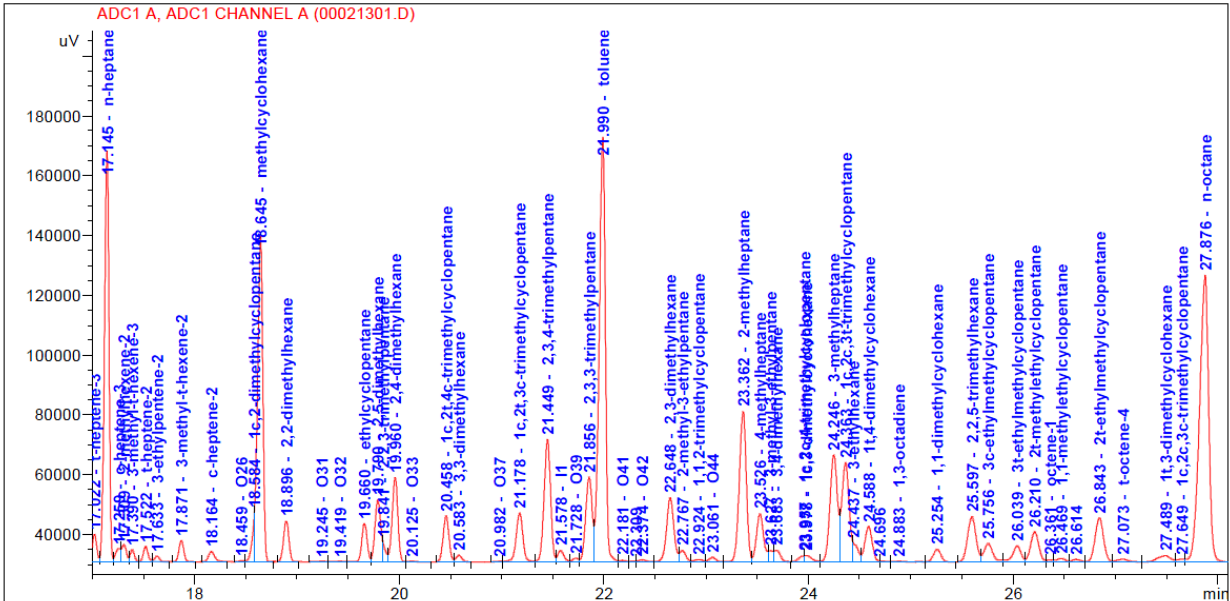


Figure Thirteen – DHAX Method from C₈ to C₉ Segment

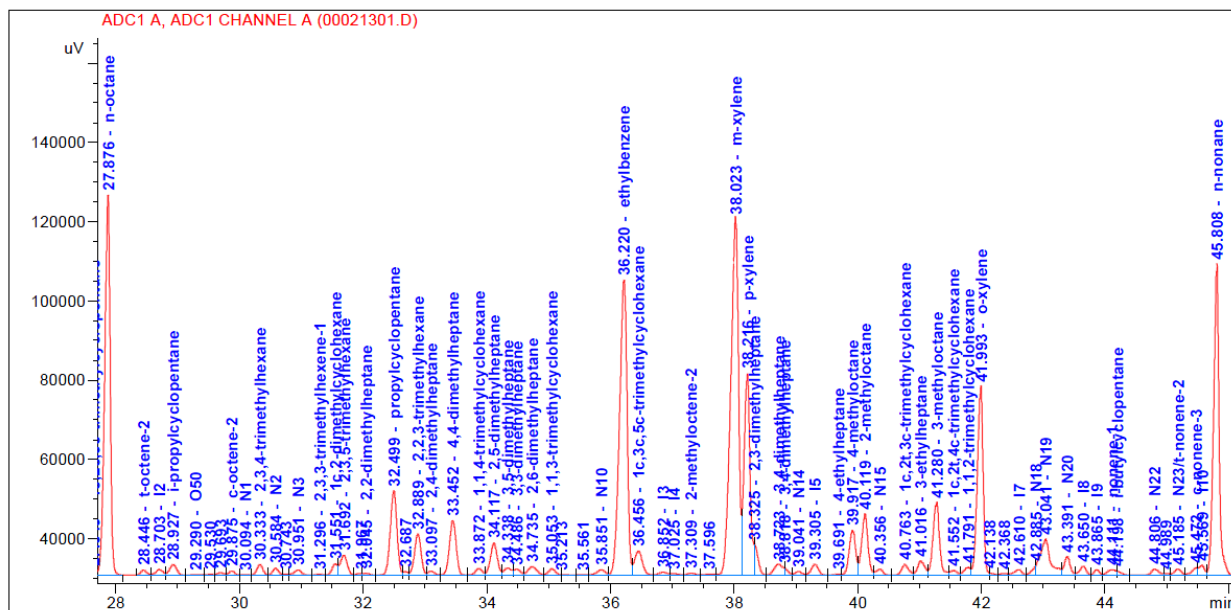


Figure Fourteen – DHAX Method from C₉ to C₁₀ Segment

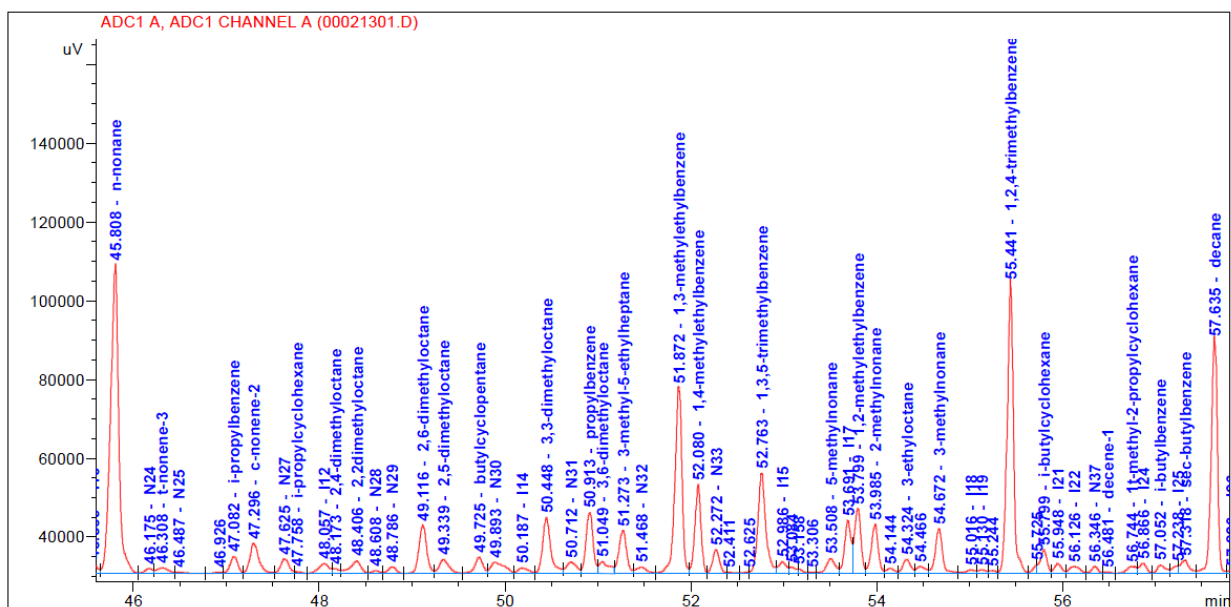


Figure Fifteen – DHAX Method from C₁₀ to C₁₁ Segment

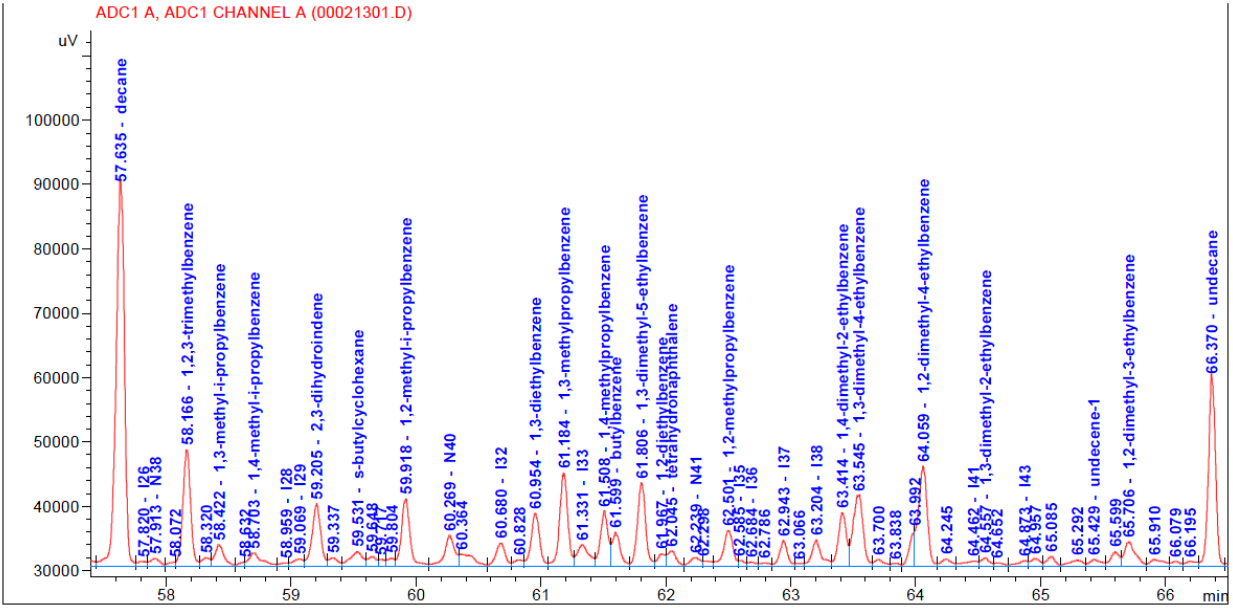


Figure Sixteen – DHAX Method from C₁₁ to C₁₄ Segment

