



VDA 278 Analysis Using Thermal Desorption

Application Note

Automotive

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The German Automobile Association method VDA 278 is a thermal desorption analysis for organic emissions from interior components of a vehicle. This analysis deals with a VOC value (up to C20-Eicosane) based on Toluene, and a FOG value (C16-C32) based on C16 (Hexadecane). It deals with the emissions coming from non-metallic molded parts occurring in motor vehicles. Materials such as textiles, adhesives, foam, leather, and similar substances are included. This method is used for both qualitative, as well as, semiquantitative evaluation of the degassed emissions. The VOC emissions are reported semiquantitatively as Toluene, whereas the FOG value is reported as condensable substances found in the materials as hexadecane. Single substances of the emission can also be identified and quantitated using this method or a variation of this method.

A serial dilution was made of a Kovats VOC standard (100 μ g/ml) to give a final concentration of 10ng/ μ l in CS₂. A thermal desorption tube (6") packed with Tenax was spiked with the standard VOC mix (20ng/2 μ l). The tube was thermally desorbed for 280°C/30min (Figure 1 and Figure 3). GC parameters were established to resolve C8 (octane) to C20 (Eicosane) and C8 to C27 (for FOG analysis). A corresponding analysis of carpet fibers was performed by placing them into an empty 6" desorption tube and desorbing them for 30 minutes at 90°C (VOC portion, Figure 2) and for 60 minutes at 120°C (FOG portion, Figure 4). A number of aliphatic hydrocarbons were identified (C13, C14, and C15) in the VOC portion as well as a propanoate ester and a number of long chain alkyl benzenes. The FOG fraction had a number of aromatics, phenol, benzyl alcohol, as well as, caprolactam. There were also long chain aliphatic alcohols and several alkanes detected.

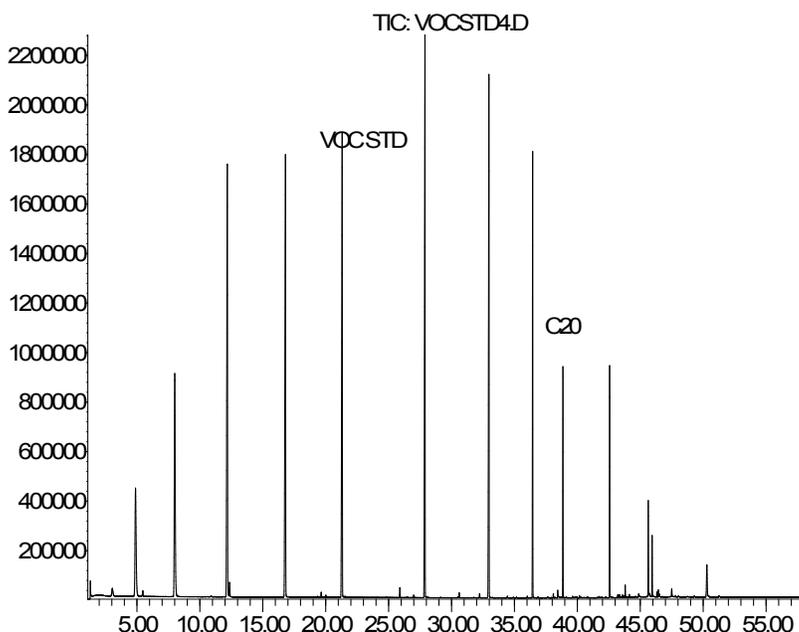


Figure 1. Standard VOC mix

Instrument Conditions

CDS Autosampler Dynatherm 9300

Valve Oven: 280°C
Transfer Line: 280°C
Tube Heat: 280°C 30 min (Kovats)
90°C 30 min (VOC)
120°C 60 min (FOG)
Trap Heat: 280°C 10 min (Kovats)
280°C 20 min (VOC & FOG)

When using an empty thermal desorption tube for "headspace" analysis, it is important to not heat a sample past its melting point.

GC/MS

Column: 5% phenyl (30m x 0.25mm)
Carrier: Helium, 50:1 split
Injector: 300°C
Oven: 40°C for 2 minutes
3°C/min to 92°C, 5°C/min to 160°C, 10°C/min to 280°C
hold 10min (VOC)
50°C for 2 minutes, 25°C/min to 160°C, 5°C/min to 160°C
10°C/min to 280°C
hold 10min (FOG)

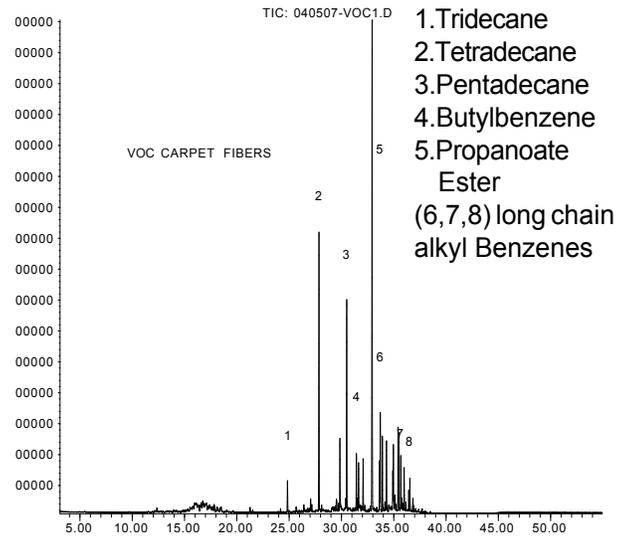


Figure 2. Carpet Fibers VOC

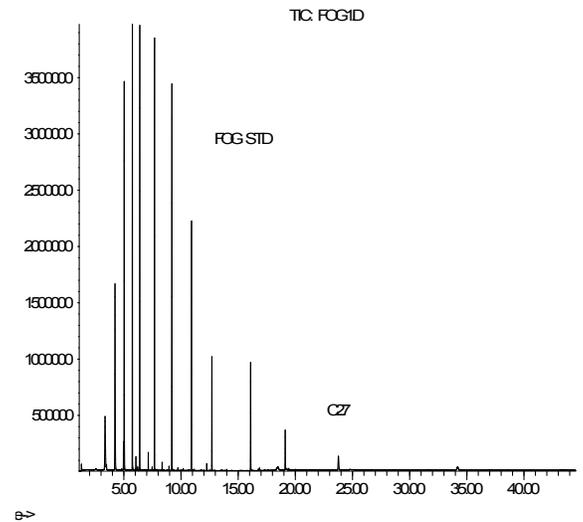


Figure 3. FOG Standard

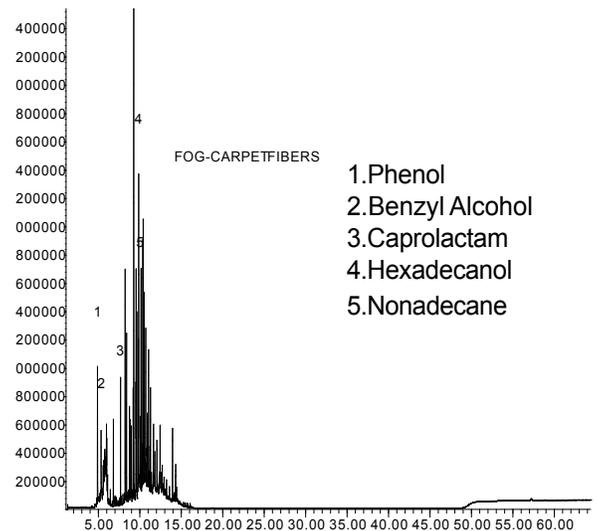


Figure 4. Carpet Fibers FOG