

# Identification and comparison of several gasoline samples by GC-FID

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## Introduction

Compounds analysis in crude oil requires first to understand how the black gold is refined before being sold.

After several physical and chemical treatments, the initial mixture is divided into several fractions called petroleum distillates, which differ from each other by their boiling point or by the number of carbons in the hydrocarbon component. More precisely, this global study is focused on "light" compounds like motor vehicle fuels, which includes gasoline. The R&D project developed in 2011 is to use gas chromatography detailed analysis to compare two different commercial products coming from the same fraction. This will allow, after data processing, to give several significant chemical properties such as mass percentage of hydrocarbons families in reference gasoline samples. The first step in this analysis is to quantify one of these major compounds, ethyl-tertio-butyl-ether(ETBE), to see how its concentration changes from one sample to another and therefore if it would be a means of identification.

## Results and discussion

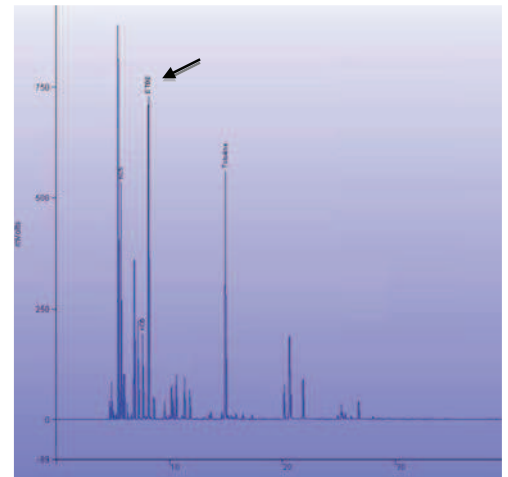
In this study, we used 3 different types of several samples from the same brand: Unleaded Gasoline (LF)98, 95 and 95E10 (lead-free with ethanol 10%). They were analyzed by gas chromatography combined to a flame ionization detector, particularly suitable to analyze this type of carbon compounds.

The analytical method performed uses temperature gradient to isolate ETBE peak with an elution neighbouring the 3-methyl-cis-2-pentene's one (figure 1)

Once each sample injected, it was possible to determine the mass percentage of the compound for each analyte through its peak area. For more precision, these injections were performed several times for the same gasoline from the same brand and the results were averaged and given as weight percentages.

LF98: 15.80% w/w  
 LF95: 6.12% w/w  
 95E10: 4.81% w/w

We noticed that the LF 98 RON Gasoline contains more ETBE than the two others; this could be a means of identification or discrimination between field samples.



**Figure 1** : Chromatogram of sample of LF 98 Gasoline. The arrow shows ETBE

## Conclusion

One way to compare and distinguish species among unleaded gasoline is detailing their mass composition through the adequate analytical system. However, these first tests were performed for the same brand; it would be interesting to do the same for other brands and to observe all the differences. This would help, by extending the method, to propose a more accurate way of identification and comparison of petroleum products found at a scene of investigation and then help investigators.



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