

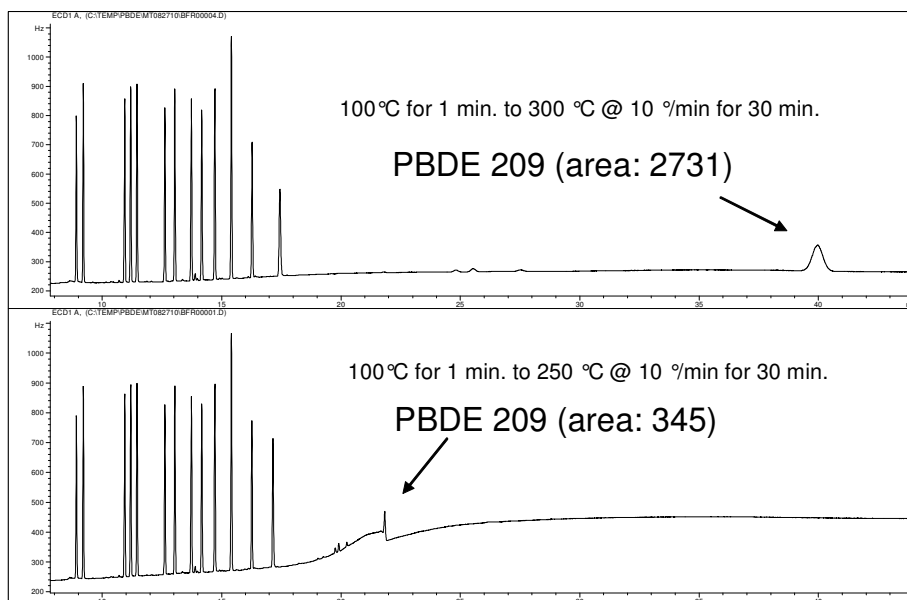
KORY'S GC TECK-TIPS

How Do I Analyze Thermally Labile Compounds by GC?

A thermally labile compound is a compound that breaks down when exposed to high temperatures. Since gas chromatography (GC) separates compounds by heating them to make them volatile, how are you supposed to analyze this type of compound without breakdown?

The answer is to expose the analyte to the lowest temperatures possible that will elute the compound. This includes inlet, column, and detector temperatures.

Below is an example of polybrominated diphenyl ethers (PBDEs) where the last PBDE congener 209 is thermally labile. Everything in both chromatograms is exactly the same with the exception of the final hold temperature. The top chromatogram elutes PBDE 209 at 250 °C and the bottom chromatogram elutes PBDE 209 at 300 °C. There are two things that are evident. There is a large difference in retention times as well as a difference in peak areas.



PBDE 209 has a very long retention time in the top chromatogram but also has a very high peak area. Even though the compound interacts with the column for a very long time, the column is not active because the compound is not breaking down.

When the congener is exposed to higher temperature as in the bottom chromatogram, it spends less time interacting with the column and elutes much earlier, but has a much lower peak area. This is because the compound is thermally labile and is breaking down due to the temperature.

When dealing with thermally labile compounds, it is important to minimize the temperatures in the chromatographic system. A balance has to be reached between long retention times due to low temperatures vs. lower peak areas because of higher temperatures. Using on-column injection, columns with thinner stationary phases, shorter column lengths, and higher carrier gas flow rates can also elute compounds at lower temperatures and therefore minimize breakdown.

Key words: Activity, PBDE, labile

Author: Kory Kelly