

Detection of PCB (polychlorinated biphenyl)

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Introduction

Cédilor is a factory which treats residues brought by trucks. First, a truck which contains chemical waste arrives on the site. Then, a sample of this waste is analysed. According to the results, this truck is sent to one of the different treatment sites.

PCBs (polychlorinated biphenyl) are analyzed because they are dangerous for the environment and humans. Indeed, they are not biodegradable and provoke irritation. Cédilor have to control the concentration of these PCBs before all treatment. These PCBs are present in oils. To detect their presence, gas chromatography is used.

Experimental conditions

Gas chromatograph (GC) (PERKIN ELMER Autosystem XL) is used to know if PCBs are present:

- Gas vector: Nitrogen
- Columns: L=25m, d=25 μ m
- Program temperature:

Oven Ramp	Rate (/min)	Temps ($^{\circ}$ C)	Hold (time/min)
Initial	0	200	0
1	15	230	0
2	4	270	0
3	0	0	0

- Split Control: Ratio n=1: 20, flow: 50mL/min
- Detector: ECD (electron capture detector)
Temperature: 365 $^{\circ}$ C Time constant: 200
Polarity: negative Filament:

Results and discussions

To characterize and calculate the concentration of PCBs in the oil, a sample with a standard PCB (AROCLOR 1254) is injected in the GC. A chromatogram of this reference sample is presented in figure 1 and the concentration is 2ppm. Retention times of this PCB are entered in the computer.

Then, the oil is dissolved in ether and is filtered until 10mL. The filtrate is injected using the reference conditions. Finally, thanks to the total area of our sample obtained on the chromatogram, we calculate the concentration in PCBs.

If there are no PCBs, the oil will be treated. If the concentration of PCBs is above 10ppm, the oil is rejected. To be sure that there are PCBs, the chromatogram must have all reference peaks on the chromatogram. However, this scenario never happened because Cédilor asks for sample of the waste product from the firm before authorizing trucks to come on the site. This sample is analyzed and PCBs is studied: their concentration must be not above 10 ppm.

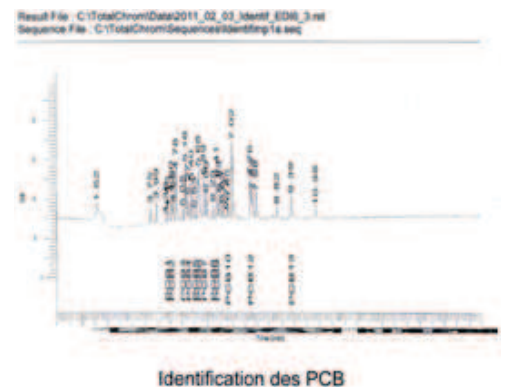


Figure 1: A reference sample containing 0.2ppm of PCBs.