C₂F₆ measurements?



Fulvio Tessarotto

C₂F₆ contaminants (gas-chromatography)

gas transparency

chromaticity

thermodynamical properties

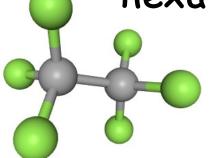
fluorescence

chemical compatibility and material outgassing

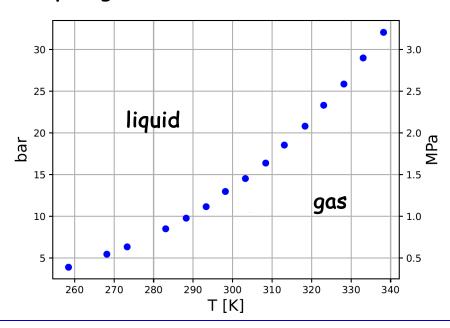
Physical properties



hexafluoroethane



1 covalent bond 6 hydrogen bonds



C₂F₆ molecular weight: 138.01 g/mol

boiling point: -78.1

melting point: -100.6 °C

density: 5.734 kg/m^3 at $24 \,^{\circ}\text{C}$ density: 16.08 kg/m^3 at $-78 \,^{\circ}\text{C}$

CERN gaschromatography







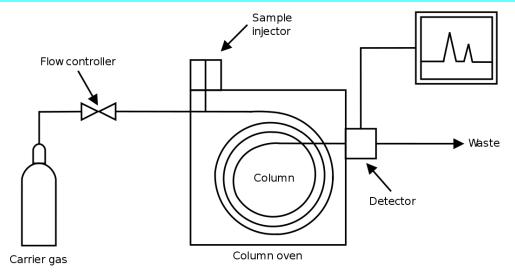




The CERN VSC (Vacuum Surface and Coating) Group has a chemical laboratory equipped with analysis instruments: Gas-chromatograph (60 m long column) with Mass Spectroscopy, IR and UV gas spectroscopy - UV transparency analyzer.

CERN gaschromatography



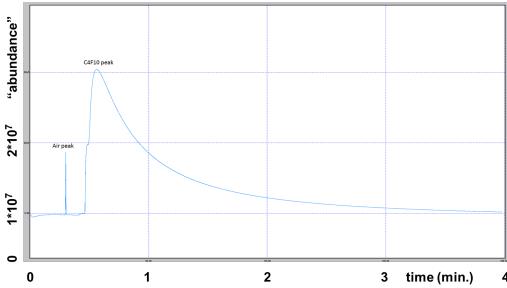


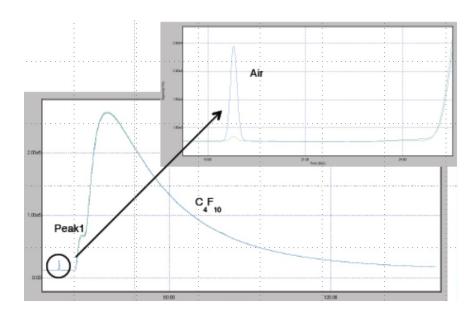
He carrier "mobile phase" in 60 m long capillary column, coated with a special "stationary phase" material.

Gaseous compounds elute at different times because the "retention time" of each compound is different (Van der Waals bonds with the stationary phase coating)

Thermal conductivity versus time is measured.

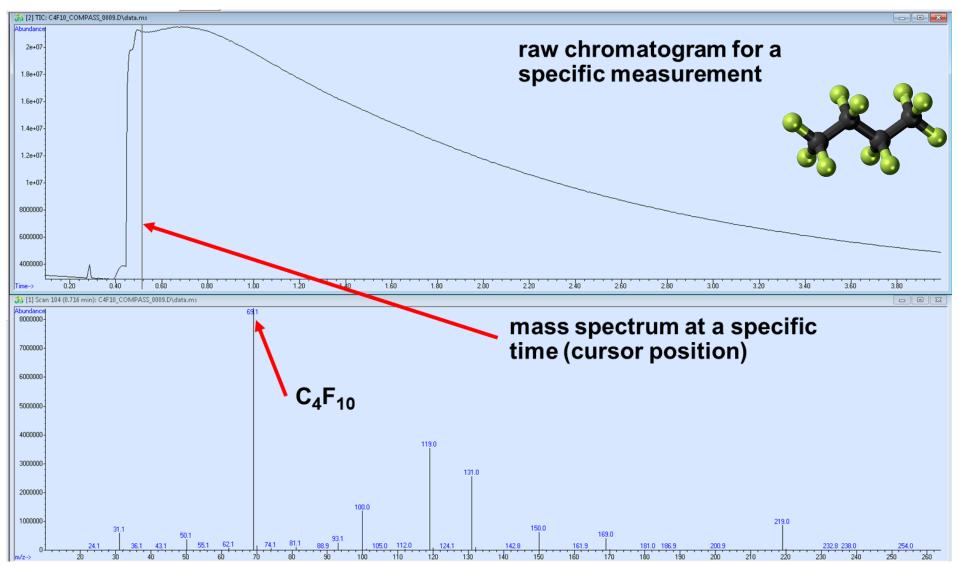
Different measurements with different temperature and He flow





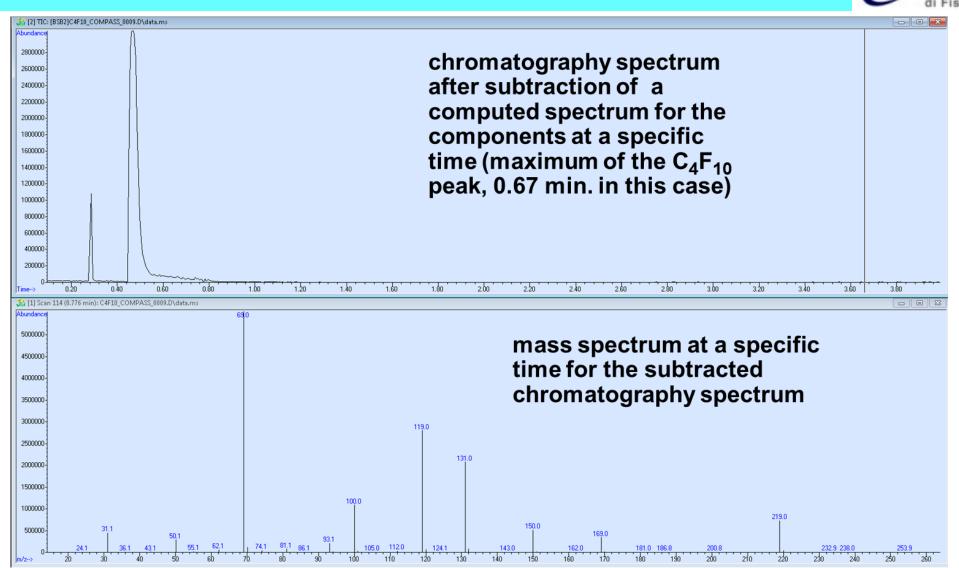
COMPASS C_4F_{10} analysis, raw





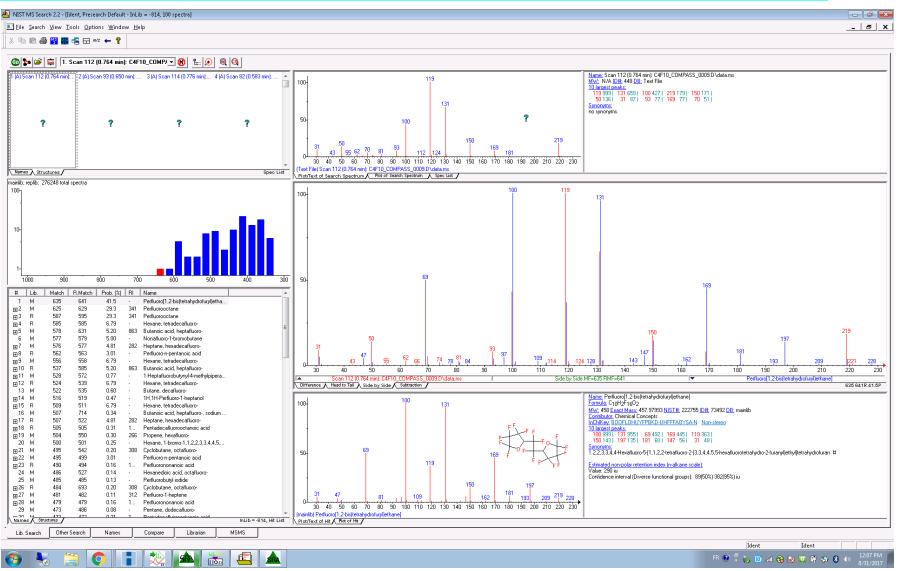
COMPASS C_4F_{10} analysis, step 2





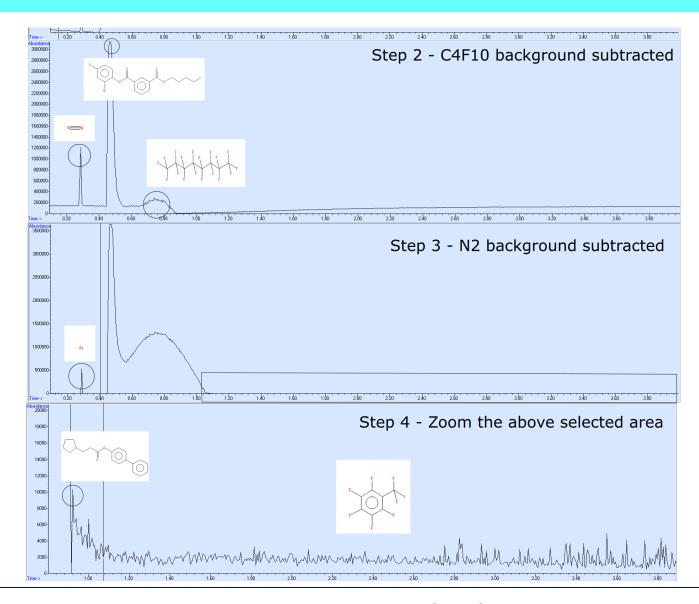
COMPASS C_4F_{10} analysis, step 3





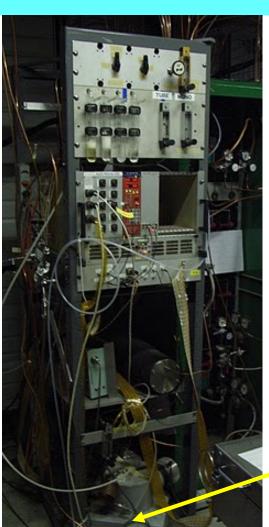
COMPASS C_4F_{10} analysis, step 4



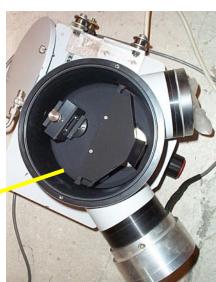


COMPASS monochromator system

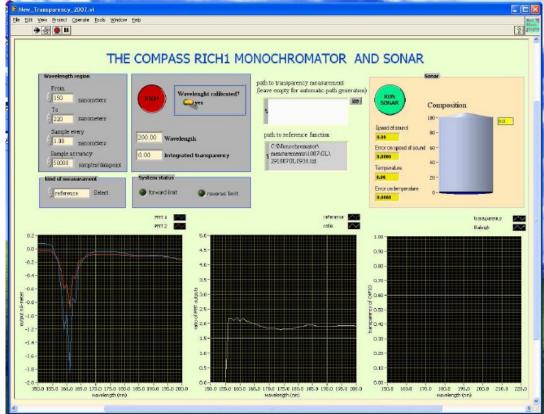




Deuterium UV lamp, Monochromator system, 1.6 m column for gas transparency measurement



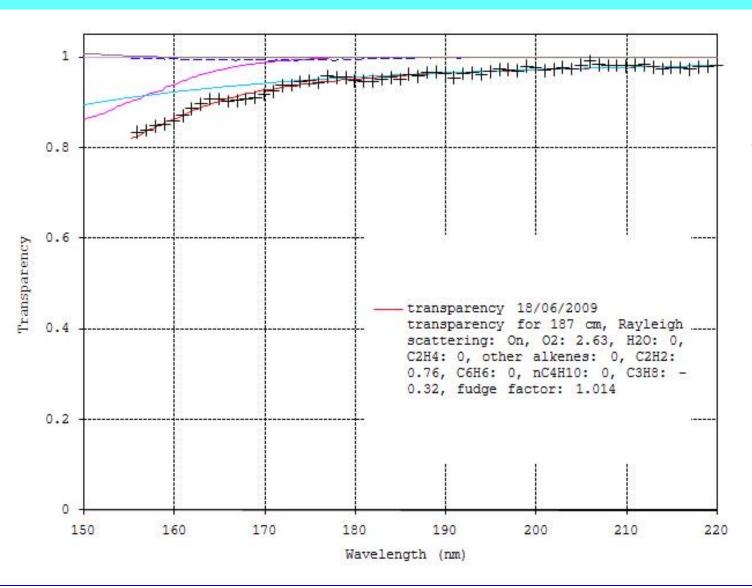
Range: 155 nm – 230 nm, 0.5 nm step



COMPASS transparency measurement



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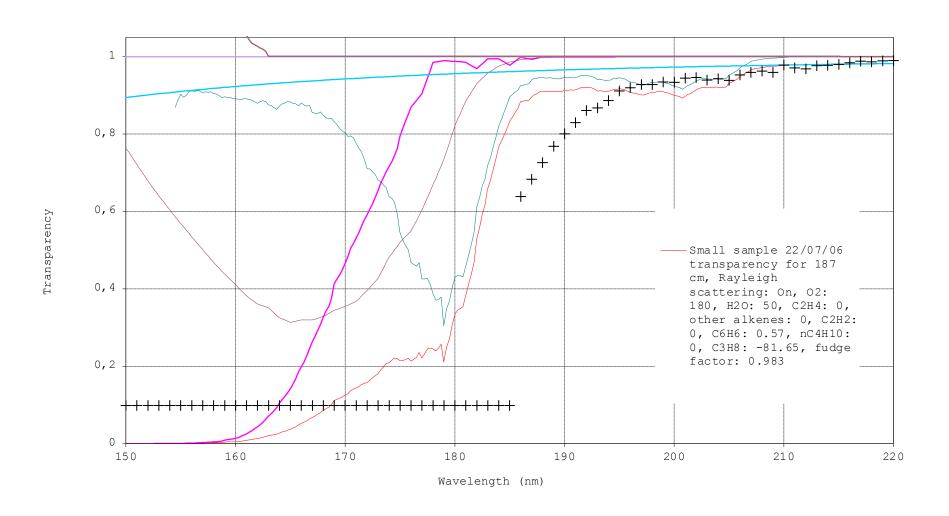
A program called "fitevil" performs the fit of the measured transparency curve.

It provides estimates of the absorption contributions from O2, H2O, C2H4, etc.

"black" UV gas sample

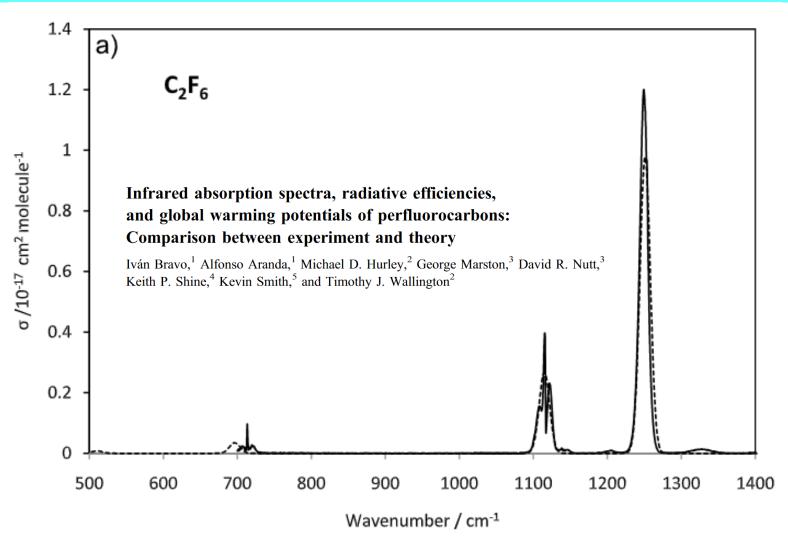


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C₂F₆ absorption spectrum





JOURNAL OF GEOPHYSICAL RESEARCH, VOL. 115, D24317, doi:10.1029/2010JD014771, 2010