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APPLICATION NOTE

No. AN53371

Analysis of aviator's breathing oxygen by FTIR spectroscopy

Fourier transform Infrared (FTIR) spectroscopy is a powerful technique to analyze the purity of gas samples used in industrial or environmental applications. Many gases of interest have unique infrared signatures, enabling FTIR to analyze multiple different compounds with a single analysis. Analysis is fast and precise, with minimal sample handling requirements, making FTIR a preferred solution compared to other analytical techniques.

An example of Thermo Fisher Scientific's FTIR analytical capabilities is the analysis of Aviator's Breathing Oxygen (ABO) for contaminants. Many military aircraft distribute breathing air to their pilots and crew using compressed oxygen cylinders, allowing them to control the environment under any flight conditions. The entire process of oxygen production distribution must be carefully controlled to maintain high-purity O_2 without contaminants that can cause safety or health hazards. For example, contaminants like methane (CH_4) or acetylene (C_2H_2) may pose risks of combustion or explosion. Other common contaminants in oxygen include chlorofluorocarbon/hydrochlorofluorocarbon (CFC/HCFC, or Freons) used as solvents or refrigerants.

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Figure 1 shows spectra of potential contaminants in ABO, including methane (CH_4), carbon monoxide (CO), acetylene (C_2H_2) and Freon R-134a. The FTIR's high spectral resolution and broad bandwidth allow it to analyze these gases and more in a single spectrum.

Thermo Fisher Scientific provides FTIR ABO systems to meet the highest military standards for US and NATO forces. Beyond military aerospace, FTIR analysis is used to certify oxygen or breathing air cylinders used by fire fighters, scuba divers, and for environmental samples.

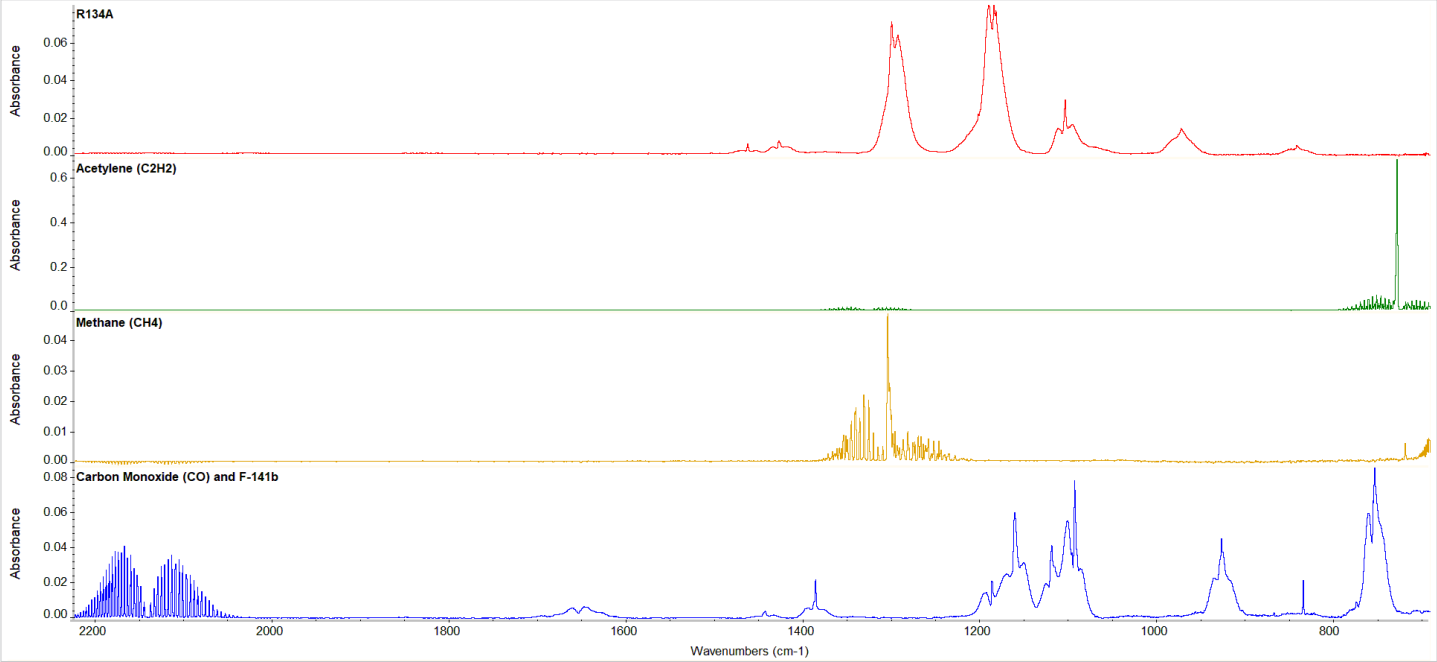

Figure 1: Potential contaminants in ABO, including methane (CH_4), carbon monoxide (CO), acetylene (C_2H_2) and Freon R-134a

Component	Concentration (ppm)
Methane	45.35
Ethane	5.48
Ethylene	0.86
Acetylene	0.17
Propane	0.00
Propane	0.09
Freon-11	0.02
Freon-12	1.90
Freon-13	1.97
Freon-22	2.09
Freon-113	0.21
TCETA	0.19
TCETA	0.00

Component	Concentration (ppm)
Nitrous oxide	3.97
Carbon monoxide	0.17
Water	2.76
Freon-141b	0.00
Sulfur hexafluoride	0.00
Freon-225	0.00
SurePrep	0.00
PFBI	0.00
Freon-134A	0.00
Freon-125	0.00
Solstice	0.00
Carbon Dioxide	9.42

Figure 2: Example of quantitative results

Find out more at **thermofisher.com/ftir**

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