

Measuring F₂/Cl₂ in Excimer Laser Gas Mixtures

Applied Analytics Application Note No. AN-046



Application Summary

Analytes: **F₂ (fluorine), Cl₂ (chlorine)**

Detector: **OMA-300 Process Analyzer**

Process Stream: **Excimer laser gas mixtures**

Typical Measurement Range: **0-1%**

Introduction

Excimer lasers have many industrial uses, from patterning the circuiting of microchips, to banding layers of transistors together, to correcting vision. Excimer lasers utilize specific combinations of halogen gases, rare noble gases, and a buffer gas. These gas mixtures are typically comprised of 2-9 % noble gas (Krypton, argon, or xenon), 0.2% halogen gas (chlorine or fluorine), and 90-98% buffer gas (helium or neon). When a specific mixture of these gases is provided with the proper electrical stimulation and pressure, different wavelengths of deep ultraviolet (DUV) light are emitted.

Premixed cylinders containing blends of XeF or KrCl, for example, are produced by specialty gas companies for sale to companies that operate excimer lasers. The quality of the excimer laser gas cylinders must be closely monitored during their production. In addition, the mixed cylinder must be validated, and the halogen gas needs to be quantified.

The OMA-300 Process Analyzer continuously outputs both F₂ and Cl₂ readings, providing new measurements approximately every 5 seconds. Response time is critical in the production of excimer laser gas mixtures in order to respond to sudden changes in product quality.

System Benefits: OMA-300 Process Analyzer

- » Continuously measures F₂ and Cl₂ levels using UV-Vis spectrophotometer
- » Totally solid-state build with no moving parts — modern design for low maintenance
- » Additional software benches for up to 4 chemical analytes
- » Ultra-safe fiber optic design with no sample gas inside analyzer unit — world's safest solution for this application

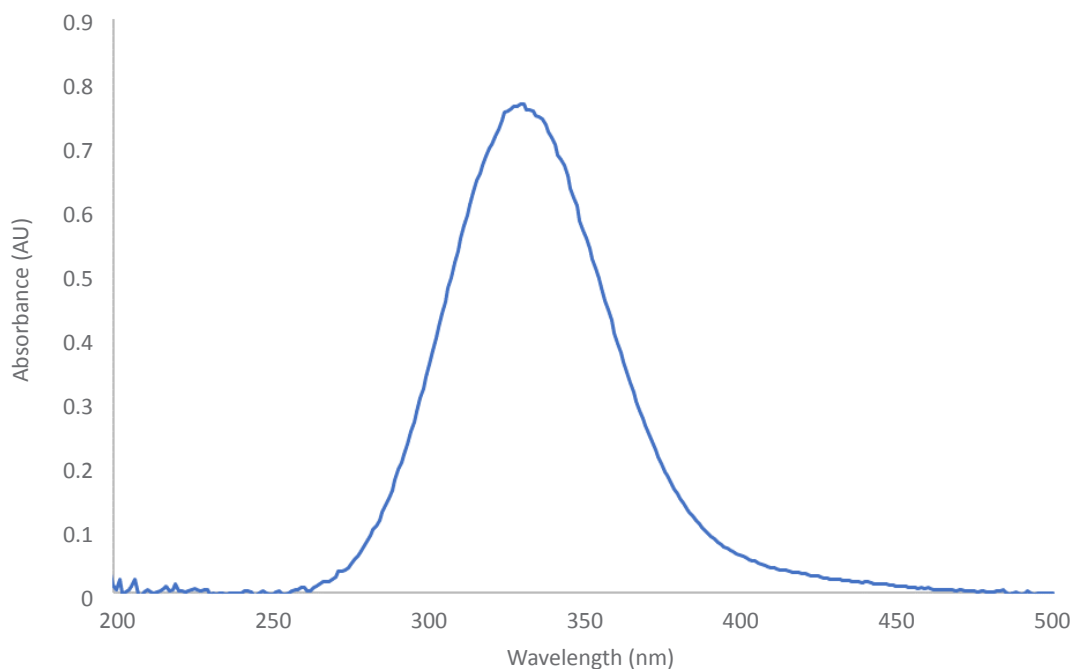
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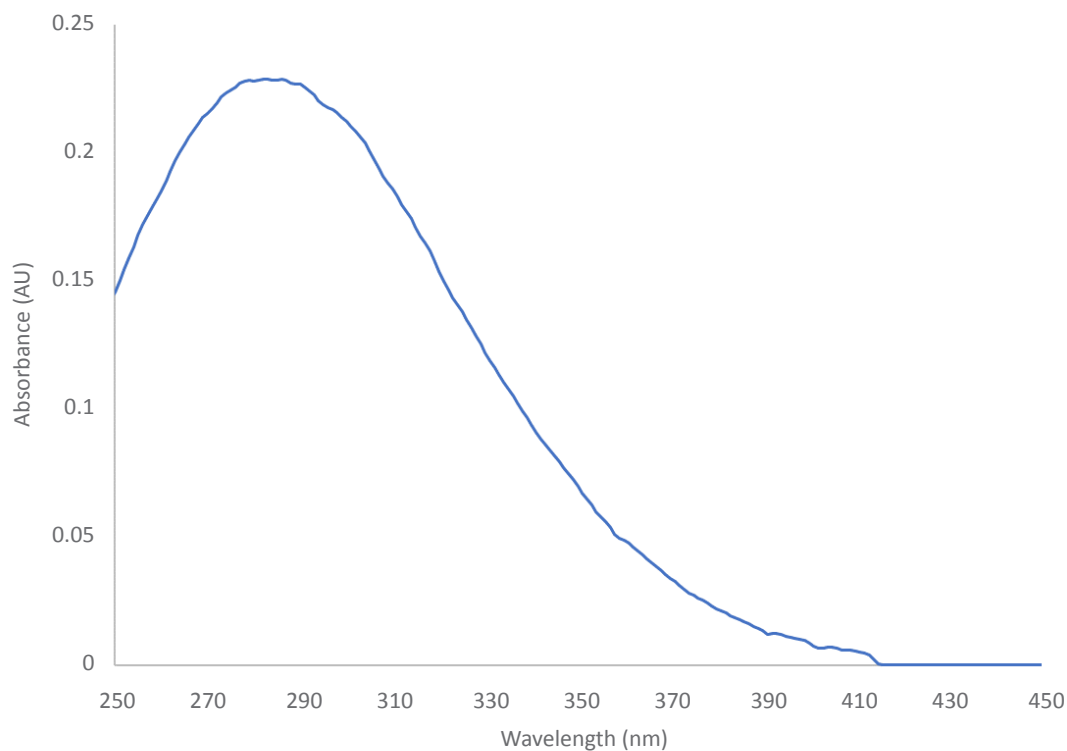
Absorbance Spectra of Cl₂ and F₂

These spectra were taken with the OMA-300 on calibration standard mixtures of Cl₂ and F₂

Cl₂ Absorbance Spectrum: 4890 ppmv Cl₂



F₂ Absorbance Spectrum: 1.08% F₂



Measuring F2/Cl2 in Excimer Laser Gas Mixtures

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Further Reading

Subject	Location
OMA-300 Process Analyzer Data sheet	https://aai.solutions/documents/AA_DS001A_OMA300.pdf
Advantage of Collateral Data Technical Note	https://aai.solutions/documents/AA_TN-202_CollateralData.pdf
Multi-Component Analysis Technical Note	https://aai.solutions/documents/AA_TN-203_MultiComponentAnalysis.pdf



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