UV Fourier transform absorption cross sections of benzene, toluene, ortho-, meta-, and para-xylene

Sophie Fally¹ (sfally@ulb.ac.be), A. C. Vandaele² (annc@oma.be), Michel Carleer¹ (mcarleer@ulb.ac.be)

¹ Université Libre de Bruxelles, Belgium
² Institut d’Aéronomie Spatiale de Belgique, Belgium

http://www.aeronomie.be

SUMMARY

WHAT? Temperature and pressure effects on the absorption cross sections of BTX in the 35000-42000 cm⁻¹ (286-238 nm) range

HOW? A Fourier transform spectrometer coupled to a 10 cm cell → Pure BTX & BTX+air mixtures spectra @ 253, 263, 273, 283, and 293 K.

What’s the problem?

- Large disagreements exist between published cross sections
- Literature cross sections were recorded at low resolutions

What this work aims at?

- Produce new (higher resolutions) laboratory measurements, and study the temperature and pressure effects on the BTX cross sections to support astrophysics and atmospheric (urban) measurements

EXPERIMENTAL

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Data processing

- Blanks recorded before and after BTX measurement
- Spectra of pure BTX at each temperature with different pressures
- Spectra of mixtures of BTX with dry air at different total pressures at each temperature
- Cross sections calculated using

\[
\frac{\Delta \varepsilon}{\varepsilon} = \frac{1}{P_{\text{tot}}} \cdot \frac{1}{n} \frac{R_{\text{tot}} - R_{\text{air}}}{R_{\text{air}}}
\]

What is the effect on the cross sections? Temperature and pressure effects on the absorption cross sections of BTX in the 35000-42000 cm⁻¹ (286-238 nm) range

CONCLUSIONS

Temperature effect on the absorption cross sections of BTX in the 35000-42000 cm⁻¹ (286-238 nm) range

High resolution absorption cross sections of BTX

Large disagreements exist between published cross sections

No temperature effect observed.