

## Characterization of Organic Compounds by means of their Self-emitted Infrared Radiation

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INFRARED emission spectra of solids can be measured with conventional spectrometers,<sup>1</sup> but that emission method has limited utility because the emitters must be near 100°C. This limitation can be overcome by interferometry, which permits the measurement of infrared spectra of organic compounds by means of self-emitted infrared radiation at low temperatures.

The instrument used was a Block Model 200 multiple-scan interference spectrometer,<sup>2</sup> described elsewhere.<sup>3,4</sup> Samples for spectroscopic study were simply prepared by evaporating small volumes of solutions of compounds which are normally solid on first-surface aluminium-on-glass mirrors of low emittance; or, in the case of liquids, by placing a small drop of liquid on a first-surface mirror and covering the drop with a KBr disc. Amounts of materials in the milligram range were used. Infrared emission spectra were then recorded at a rate of one scan of the range 3–15 $\mu$  per second at a spectral revolution of 30 cm.<sup>-1</sup>

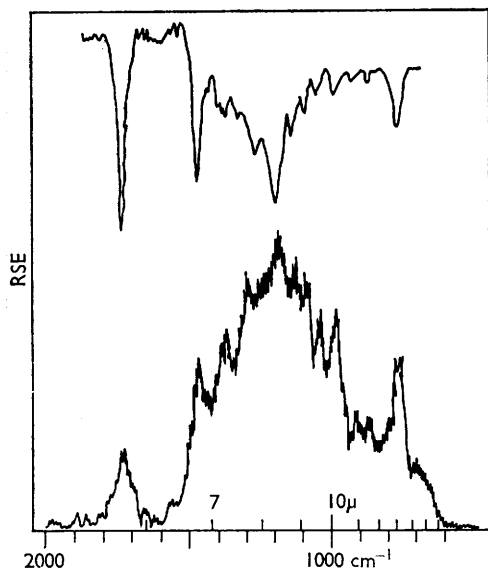


FIGURE 1. Emission spectrum of butyl stearate at 30°, 160 scans.

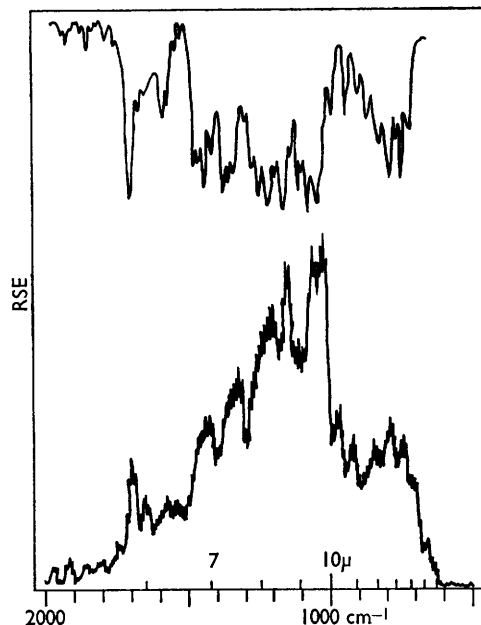


FIGURE 2. Emission spectrum of atropine at 30°, 300 scans.

under the conditions indicated, and are shown as the lower traces in the Figures. Absorption spectra obtained with a Perkin-Elmer Model 521 spectrometer are shown for comparison. Typical examples of numerous substances examined are shown in the Figures, where the ordinates of transmittance and relative spectral emittance (RSE) are arbitrary.

Emission spectra of good quality could be obtained easily, comparison of emission and absorption spectra showing good correspondence between emission and absorption bands. The sample preparation for emission studies was minimal in distinct contrast to that for absorption-transmission measurements, particularly with solids. As numerous sampling difficulties such as mulling, solvent effects, changes in bands with the state of aggregation, and the like can be avoided by the emission method, the latter should prove

<sup>1</sup> M. J. D. Low and H. Inoue, *Analyt. Chem.*, 1964, **36**, 2397.

<sup>2</sup> Block Engineering Inc., Cambridge, Mass.

<sup>3</sup> L. C. Block and A. S. Zachor, *Appl. Optics*, 1964, **3**, 209.

<sup>4</sup> M. J. D. Low and I. Coleman, *Spectrochim. Acta*, 1965, in press.

to be a valuable tool for the infrared examination of materials and be particularly useful for the study of opaque solids and of biological materials.

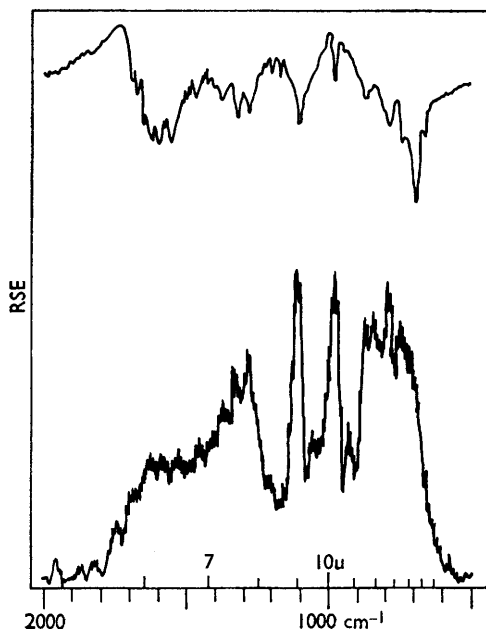


FIGURE 3. Emission spectrum of uric acid at 30°, 300 scans.

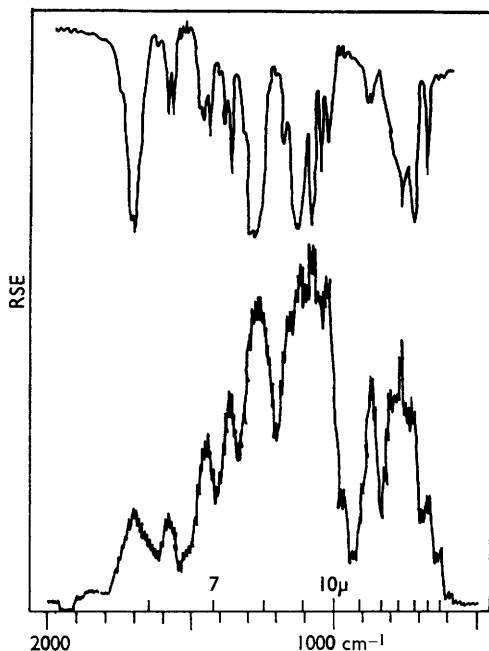


FIGURE 4. Emission spectrum of diethyl phthalate at 28°, 120 scans.

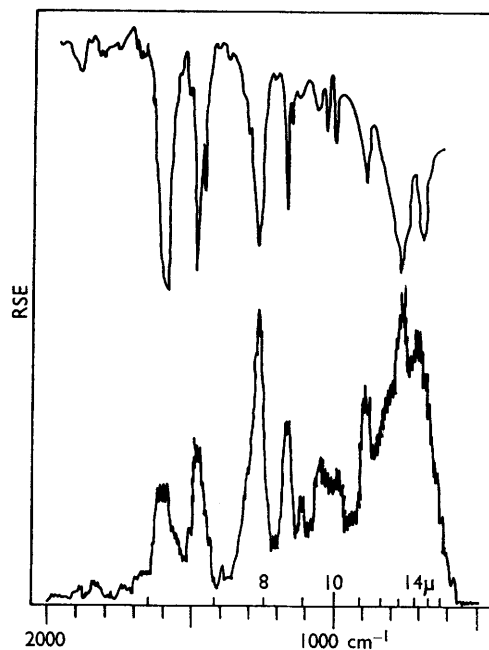


FIGURE 5. Emission spectrum of aniline at 30°, 200 scans.

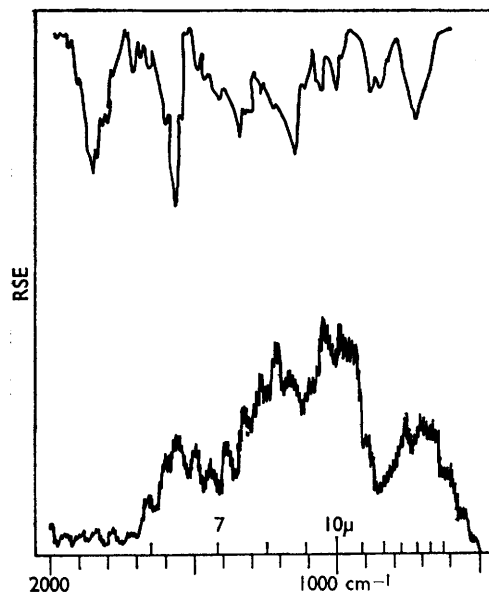


FIGURE 6. Emission spectrum of L-(+)-ascorbic acid at 50°, 300 scans.

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