

Quantitative estimation of substances spotted on filter paper by photoacoustic spectroscopy⁺

T SOMASUNDARAM, SANJAY S R RAO† and P GANGULY*

Solid State and Structural Chemistry Unit, Indian Institute of Science, Bangalore 560 012, India

†Department of Zoology, University of Poona, Pune 411 007, India

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Abstract. Quantitative estimation of coloured as well as colourless substances spotted on filter paper has been carried out by means of photoacoustic spectroscopy. The technique should be specially useful in the estimation of biological substances.

Keywords. Photoacoustic spectroscopy; quantitative estimation of spots on filter papers.

1. Introduction

Advantages of photoacoustic spectroscopy (PAS) in the study of materials, normally inaccessible to conventional optical spectroscopic techniques, have been described by various workers in the last few years (Rosencwaig 1980; Ganguly and Rao 1981; Tam 1986). Opaque and light scattering materials such as powders have been studied by Rosencwaig (1975). Adams *et al* (1980) have studied the quantum efficiency of solid fluorescent materials. Phase transition studies have been carried out by Florian *et al* (1978) and Somasundaram *et al* (1986a). Recently, Jagannathan *et al* (1982) have shown that PAS can be used for the study of surface acidities of solid oxide catalysts. Busse and Orgaback (1980) have used PA effect for depth profiling studies. Even biologically important materials have been studied by PAS. For example, Cahen *et al* (1978) have studied photosynthesis of chloroplast membranes; Balasubramanian *et al* (1984) have studied malaria parasites; Somasundaram *et al* (1986b) have studied the pigments in the thermophilic fungi.

The technique has been used for qualitative estimation of substances adsorbed on thin layer chromatograms by Rosencwaig (1975). Achwal *et al* (1984), however, have carried out quantitative estimation of 5-methylcytosine present in the DNA of *Drosophila melanogaster* by making use of a sensitive immunochemical assay and PA spectroscopy. These authors have used nitrocellulose paper for spotting the DNA and analysed the spectra for estimating the amount present. We considered it most worthwhile to investigate whether PAS was suitable for the quantitative estimation of substances spotted on ordinary filter papers, since a successful demonstration of such an application would open up a new dimension in analytical methods, especially in the case of biological substances. Estimation of substances spotted on filter paper would also serve to demonstrate one of the quintessential advantages of PA spectroscopy.

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* To whom all correspondence should be addressed.