



March, 1969

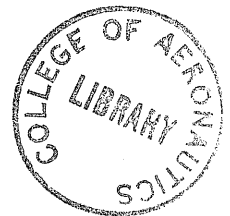
THE COLLEGE OF AERONAUTICS

DEPARTMENT OF MATERIALS

The thermal degradation of aromatic  
polyimides in nitrogen at 700°C

- by -

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SYNOPSIS

The thermal degradation of aromatic polyimides in nitrogen at 700°C was studied using pyrolysis gas chromatography, infra red spectroscopy, and radiochemical techniques. Degradation mechanisms were postulated to account for the breakdown products found. Particular attention was paid to the ratio of CO<sub>2</sub>/CO evolved during pyrolysis and this was found to vary with the moisture content of the polyimide and with the pyrolysis temperature.

Acknowledgements

The authors acknowledge the fellowship from the Ministry of Technology under which this work was carried out, and wish to thank Dr. W.W. Wright and Mr. R.A. Dine-Hart of R.A.E. Farnborough for supplying some of the polyimide samples.

The Thermal Degradation of Aromatic Polyimides in Nitrogen

Introduction

Aromatic polyimides (Fig. 1) have been well publicised as 'high temperature polymers', <sup>1-5</sup> and although their behaviour at high temperatures has been studied <sup>1-11</sup>, the mechanism of their thermal degradation is not well established.

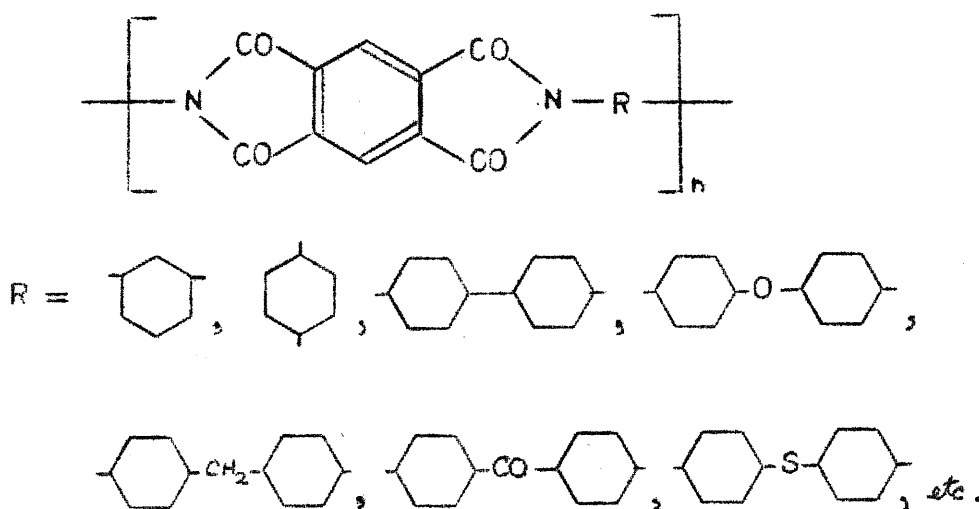


FIG. 1 AROMATIC POLYIMIDES.

A number of workers have carried out thermogravimetric analyses on polyimides in air and in various inert atmospheres. <sup>1-3, 6-11</sup>. Bruck,<sup>7</sup> and Heacock and Berr<sup>2</sup> have collected and identified volatile degradation products, and Bruck has also investigated the nature of the 'tar' and the 'char' which are formed on pyrolysis in inert atmospheres.<sup>7,8</sup>

As a result of these studies, which are summarised in Tables I and II, it is known that aromatic polyimides begin to break down between 450 and 500°C in air and between 500 and 600°C in inert atmospheres, depending on the nature of R (Fig. 1) and on the purity of the cured polymer.













































