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Some Properties of the Sulphuric Acid Condensing on Cool Surfaces from Gases containing Sulphur Trioxide

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PART I

THE CONCENTRATION AND RATE OF CONDENSATION OF SULPHURIC ACID FILMS

by H. D. Taylor

SUMMARY

Laboratory apparatus and techniques have been developed for sampling and analysing the sulphuric acid condensing from a gas mixture of known water vapour and sulphur trioxide contents.

Two main properties have been studied:
(1) the concentration of the condensed acid, and
(2) the rate at which the condensation takes place.

Over the range of composition studied (from 60-600 p.p.m. of SO_3), it has been found that the concentration of the condensate is not affected by the proportion of sulphur trioxide present. It is a function only of the surface temperature and the water vapour content of the gases, and, independent of the latter, there is a peak in the rate of condensation at a surface temperature approximately 45-50°C. below the dew-point. The magnitude of this peak increases with increasing dew-point.

(1) Introduction

Problems associated with the presence of SO_3 in the flue gases from the combustion of solid fuels are being investigated by the Boiler Availability Committee.* As was noted by Johnstone,[1] a characteristic property

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* The Boiler Availability Committee is representative of the British Electricity Authority, the Watertube Boilermakers Association, the Fuel Research Board and the British Coal Utilisation Research Association.