

THE BRITISH COAL UTILISATION RESEARCH ASSOCIATION

Information Circular No. 33

The Effect of Carbon Smokes on Corrosion and
Dew-point Phenomena in Gases containing Sulphur Trioxide

by D. Flint, R. W. Kear and G. Whittingham

PART I

THE INFLUENCE OF CARBON SMOKES ON THE
DEW-POINT AND SULPHUR TRIOXIDE CONTENT OF FLAME GASES

by G. Whittingham

SUMMARY

Dew-point and chemical methods of analysis have been used to investigate the effect of carbon smokes on the SO_2 content of flame gases. As the quantity of smoke increases from zero the conductivity-temperature characteristics of condensed films of acid become complex owing to the deposition of electrically conducting carbon on the dew-point element. The results show that deposited carbon and sulphuric acid films react at temperatures above about 140°C . and that the SO_2 content of the gases is decreased in the presence of carbon. Consideration is given to the means whereby the SO_2 content is lowered.

(1) Introduction

The combustion of coal in fuel beds can normally be regarded as a two-stage process in which the ignition of the volatile matter initially distilled off is followed by the combustion of the residual coke. The flame produced above the fuel bed during the ignition stage is luminous and sooty whereas the characteristic blue appearance of the carbon monoxide flame is observed during the burning out stage. During this second stage the temperature of the coke reaches extremely high values and some of the inorganic impurities are released, either as vapour or as particulate matter, giving rise to external deposits and corrosive condensates on heat-exchange surfaces in contact with the flue gases. A general account of the problem and of the researches concerning the fundamental causes of boiler fouling has been given in publications of the Boiler Availability Committee*1,2,3 and elsewhere.4,5

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