of fractional surface renewal up to 100 per sec. were found.

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Growth and Adhesion of Oxide in Furnace Deposits

DURING the oxidation of steel there are formed on the surface a variety of needle or plate-like growths of oxide which, for convenience, have been called 'oxicles'. The present investigation, supported by and in collaboration with the Thornton Research Centre of Shell Research, Ltd., began with the idea that these oxicles might entrap particles in burnt gases and thus act as the nucleation for the build-up of ash deposits. Accordingly a series of experiments have been undertaken in which specimens of 5 per cent chromium, 0.5 per cent molybdenum steel sheet have been oxidized in an oil-burning rig and examined by reflexion electron microscopy.

The results show, first, that whether or not oxicles are formed by pre-oxidation in air before the specimens are put into the oil-burning rig, the subsequent growth is similar. Secondly, there is a very large difference between the oxicle growth which occurs when the specimen is exposed to clean oil products and that obtained with oil containing a soluble metallic salt expected to give greater build-up of deposits. In the first case the growths are small, as

shown in Fig. 1, whereas in the second case when oil containing a soluble metallic salt is used, large spiky oxicles occur of composition as yet unknown and these in turn do seem to collect very small particles of ash among their branches in accord with the original hypothesis (Fig. 2). Thus, although the oxicles trap some fine ash particles, this mechanism is not necessarily the dominant factor in the build-up of deposits.

The mode of attachment of the fluffy material at the tops of some of the oxicles suggested an electrical effect. The oil-burning apparatus was therefore modified so that the specimen holder was insulated from the rest of the rig and could be raised to $\pm 3,000$ V. with respect to it. Depending on the sign of the applied voltage, there was a marked difference in oxidation behaviour. In the tests with positive or zero potential, the scale was adherent, and the specimen developed a dull surface finish; but in the tests where the charge was negative, the scale was non-adherent and the metal surface retained a bright appearance. The pick-up of fine ash material did not seem to be appreciably affected. Fig. 3 shows the flaking away of the oxicle growth after oxidation with $-3,000$ V. applied to the specimen.

Work is proceeding to investigate these effects more fully.

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New Data for the Calcium Silicate, 'Phase Z'

THIS compound was first described by Roy^{1,2}, who considered it to be $9\text{CaO} \cdot 6\text{SiO}_2 \cdot \text{H}_2\text{O}$. Further work now shows that, while specimens prepared at relatively low temperatures and pressures may be hydrated, those prepared at sufficiently high temperatures and pressures are anhydrous, with the composition $\text{Ca}_3\text{Si}_2\text{O}_7$. They also establish the approximate unit cell parameters.

Fig. 1. Oxicle growth on 5 per cent chromium, 0.5 per cent molybdenum steel sheet after 15 min. at 600°C . in air plus 6 hr. at 600°C . in an oil-rig burning pure kerosene. ($\times 2,960$)

Fig. 2. Oxicle growth on 5 per cent chromium, 0.5 per cent molybdenum steel sheet after 15 min. at 600°C . in air plus 6 hr. at 600°C . in an oil-rig burning kerosene containing 1 per cent of a soluble metallic salt. ($\times 1,480$)

Fig. 3. Oxicle growth on 5 per cent chromium, 0.5 per cent molybdenum steel sheet after 30 min. at 600°C . in air followed by 6 hr. at 800°C . in an oil-rig burning kerosene containing 1 per cent of a soluble metallic salt. A potential of $-3,000$ V. was applied to the specimen. ($\times 980$)