

LOW TEMPERATURE OXIDATION BEHAVIOUR OF STAINLESS
STEEL IN PRESENCE OF SULPHUR-BEARING COMPOUNDS

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By

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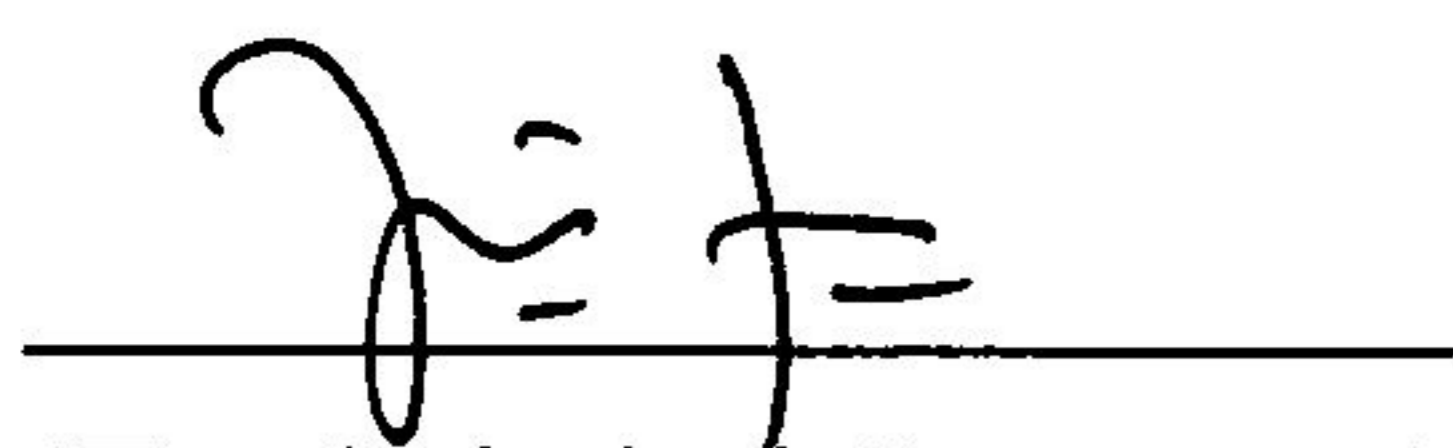
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ABSTRACT

Generally most of the metals exposed to the corrosion process as a result to reaction with air at atmosphere (nature process). Normally in natural condition, the corrosion process occurs at a long period of time. However, corrosion was more active with present of certain materials in corrosive agent. The low temperature oxidation behaviour of stainless steel was studied in the presence of sulphur, $\text{Cr}_2(\text{SO}_4)_3$ and MgSO_4 in the temperature range between 700°C – 900°C for a period of 120 hours. Overall, the ionic salts have harmful effect on the protectively of the scales and rapid degradation of the stainless steel. Magnesium sulphate (MgSO_4) shows it cause the most active corrosion at all temperatures. The kinetics curves show a substantial increase in the oxidation rate at temperature above 800°C . The alloy exhibits good oxidation resistance below 700°C . The low oxidation resistance above 700°C is related to the occurrence of internal oxidation. The susceptibility to suffer a deep attack by internal oxidation increases with increasing the temperature. As a result, the corrosion process occurs more aggressive at high temperature as 900°C .

ABSTRAK

Pada amnya, kebanyakan logam akan mengalami proses pengaratan akibat daripada tindakbalas dengan udara (semulajadi). Biasanya dalam keadaan semulajadi proses pengaratan akan berlaku dalam jangkamasa yang panjang. Namun begitu, pengaratan akan berlaku dengan aktif lagi dengan kehadiran bahan-bahan tertentu sebagai agen pengaratan. Sifat pengoksidaan pada suhu rendah bagi “stainless steel” dipelajari dengan kehadiran sulfur, $\text{Cr}_2(\text{SO}_4)_3$ dan MgSO_4 di dalam julat suhu antara 700°C – 900°C untuk tempoh selama 120 jam. Keseluruhannya, garam ionik telah memberi kesan yang kuat kepada perlindungan bagi skala dan darjah ketahanan bagi “stainless steel”. Magnesium sulfat menunjukkan pengaratan yang aktif pada setiap suhu. Keluk kinetik menunjukkan sesetengah peningkatan bagi kadar pengoksidaan pada suhu diatas 800°C . Rintangan pengoksidaan bagi logam ini baik di bawah suhu 700°C . Rintangan pengoksidaan yang rendah pada suhu diatas suhu 700°C menunjukkan kejadian pengoksidaan dalaman. Serangan dalaman dipengaruhi oleh peningkatan pengoksidaan dalaman dengan peningkatan suhu. Daripada hasil yang diperolehi, proses pengaratan lebih agresif pada suhu yang tinggi seperti 900°C .