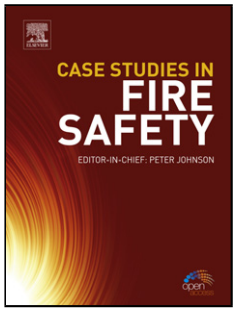

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Mechanisms of hot corrosion of pure nickel at 700°C: influence of testing conditions

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Highlights

• Mechanisms of hot corrosion governed by both $pO2$ and $pSO3$.

• Inward transport of SO2/SO3 demonstrated to rule the oxidation-sulphidation of pure nickel.

• The Na2SO4 deposit decreases the $pO2$ and the $pSO3$ at the scale surface.

• A sufficient $pSO3$ is required to stabilize Na2SO4-NiSO4 liquid solutions and simulate Type-II hot corrosion conditions.

• The role of capillarity effects is elucidated.

ABSTRACT

The hot corrosion behaviour of pure nickel was investigated at 700°C to highlight the influence of testing conditions (composition of the atmosphere and presence or not of a Na_2SO_4 deposit) on the mechanisms of hot corrosion. The influence of SO_2/SO_3 inward transport through the porous NiO growing scales was studied by exposing nickel in synthetic air and in synthetic air + 0.5% SO_2/SO_3 without Na_2SO_4. The addition of Na_2SO_4 decreased the p_{O_2} and the p_{SO_3} at the sample surface, which promoted the formation of Ni-S liquid solution at the metal/scale interface. A sufficient p_{SO_3} was required to stabilize liquid Na_2SO_4-$NiSO_4$ solutions and simulate Type-II hot corrosion conditions.

Keywords: Nickel, Oxidation, Sulphidation, Hot corrosion, Sodium sulphate