Corrosion characterization of alumina on 20G carbon syeel in industrial incineration ash

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Abstract: The high-temperature corrosion characteristics of 20G steel in industrial incineration ash were studied through weight gain experiments, response surface analysis and Material stuido simulation, and the corrosion inhibition mechanism of alumina particles was investigated. The results show that the corrosion weight gain of industrial incineration ash on metal changes with time in a parabolic pattern, and the corrosion weight gain gradually decreases after adding alumina. Alumina promoted the formation of high melting point minerals such as $Ca_2Al_2SiO_7$ and Al_2SiO_5 in industrial incineration ash. Response surface results showed that the interaction of experimental temperature and corrosion time had the greatest effect on the weight gain of metal corrosion. At the same temperature, the binding energy between NaCl and alumina is significantly larger than that between NaCl and Fe. Strong chemical interactions between Na^+, Cl^- and alumina were obtained by RDF radial function calculations. At the same temperature, the diffusion coefficients of Na^+ and Cl^- on the surface of alumina were larger than those on the surface of Fe. NaCl was more likely to bind to the alumina than to the metal surface, thus alleviating the corrosion of metals by industrial incineration ash.

Keywords

high temperature corrosion, industrial incineration ash, alumina, corrosion characteristics

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