INTISARI

Pemerintah Indonesia mendorong penggunaan energi terbarukan untuk mengurangi ketergantungan pada bahan bakar fosil, salah satunya dengan memanfaatkan biomassa di pembangkit listrik tenaga uap (PLTU) melalui metode *cofiring*. Indonesia memiliki potensi biomassa besar, termasuk dari limbah sampah perkotaan atau bahan bakar jumputan padat (BBJP). Namun, karakteristiknya yang berbeda dengan batubara, terutama konsentrasi klorin (Cl) yang tinggi, dapat mendegradasi unsur logam selama pembakaran. Penelitian ini bertujuan untuk menyelidiki pengaruh penambahan BBJP sebesar 10% ke dalam batubara terhadap degradasi awal material baja tahan karat yang disebabkan oleh endapan abu selama pembakaran.

Penelitian ini dilakukan dalam skala laboratorium menggunakan *drop tube furnace* dengan metode uji korosi jangka pendek pada empat interval waktu. Hasil pengujian selanjutnya dilakukan analisis yang terdiri dari analisis endapan abu, transformasi mineral, evaluasi struktur mikro material probe, dan evaluasi pengurangan ketebalan.

Hasil penelitian menunjukkan bahwa kandungan klorin dalam BBJP-10 sebesar 0,035 wt% secara substansial mempengaruhi degradasi awal material baja tahan karat selama pembakaran. Lapisan oksida mulai terdegradasi pada jam kedua karena endapan abu, mencapai 2,38 μm. Kehadiran Ca (1,11%), K (1,66%), Na (4,46%), dan Cl (0,42%) meningkat menjadi 1,12% pada permukaan logam, secara bertahap menyerang area substrat dan membentuk rongga. Degradasi meningkat secara linear hingga probe-8, mengakibatkan hilangnya ketebalan sebesar 3,81 μm dan penurunan kandungan kromium secara signifikan, yang menurun sebesar 12,54%. Temuan ini menyoroti pentingnya memahami dampak kadar klorin dalam BBJP, yang dapat mendegradasi logam secara agresif.

Kata kunci: Bahan bakar jumputan padat, *co-firing*, endapan abu, degradasi awal, korosi suhu tinggi.

ABSTRACT

The Indonesian government is promoting the use of renewable energy to reduce dependence on fossil fuels, one method being the utilization of biomass in coal-fired power plants (CFPP) through cofiring. Indonesia has significant biomass potential, including from municipal waste or refuse derived fuel (RDF). However, its different characteristics from coal, especially the high concentration of chlorine (Cl) in ash deposits, can lead to the degradation of metallic elements during combustion. This study aims to investigate the effect of adding RDF to coal on the initial degradation of austenitic stainless steel material caused by ash deposition during combustion.

The research was conducted on a laboratory scale using a drop tube furnace with a short-term corrosion test method at four time intervals. The experimental results were analysed, which consisted of ash deposition analysis, mineral transformation, microstructural evaluation of the probe material, and thickness reduction evaluation.

The results showed that the chlorine content in RDF-10, at 0.035 wt%, substantially affected the initial degradation of austenitic stainless steel material during combustion. The oxide layer began to degrade in the second hour due to ash deposition, reaching a thickness of 2.38 μm. The presence of Ca (1.11%), K (1.66%), Na (4.46%), and Cl (0.42%) increased to 1.12% on the metal surface, gradually penetrating the substrate area and forming voids. The degradation increased linearly up to probe-8, resulting in a thickness loss of 3.81 μm and a significant decrease in chromium content, which dropped by 12.54%. These findings highlight the importance of understanding the effect of chlorine levels in RDF, which can aggressively degrade metals.

Keywords: Refused-derived-fuel, co-firing, ash deposits, initial degradation, high temperature corrosion.