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Co-oxidation of Ammonia and Isopropanol in Supercritical Water in a Tubular Reactor

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ABSTRACT

The role of isopropanol (IPA) in the supercritical water oxidation (SCWO) of ammonia (NH₃) was investigated through different experiments using an isothermal laboratory tubular reactor with hydrogen peroxide as the oxidant. Reactions were conducted under temperatures in the range of 400 to 525 °C, at a pressure of 25 MPa with initial concentrations of ammonia of 10 mM, oxidant stoichiometric ratio between 0.8 and 1.5; co-fuel (IPA)/ammonia ratio between 0.125 and 3, and residence times of 2 to 10 seconds.

Improvements in the ammonia removal were only appreciated with the lowest IPA/NH₃ molar ratios (0.125 and 0.25) while the oxygen ratio did not have significant influence in the ammonia removal. Nevertheless, a direct relation between the nitrate concentration and the oxygen in excess was found. Nitrate concentration was also found to increase when the IPA/ammonia ratio increased.

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