The Effect of Power on Nitrate Synthesis and The Emission Intensities of Reactive Species Using Anodic Plasma Electrolysis

ABSTRACT

Nitrates are used as fertilizer to fulfill nutrients for plants. Anodic plasma electrolysis technology can be an effective and environmentally friendly solution in nitrogen fixation into nitrate compounds. This research aimed to determine the effect of controlling voltage and power in nitrate synthesis using plasma electrolysis with air as the raw material injected at the anode. The material used is an electrolyte solution of 0.02 M K_2SO_4, the electrodes used are in the form of tungsten and stainless steel, and a nitrate reagent is used for the nitrate test. The results of the study showed that at 400 W, the optimal rate was 0.8 L men^{-1} with 1889 mg L^{-1} of nitrate formed. While at 500 W and 600 W, the optimal rate of 1 L men^{-1} with nitrate formed was 2213 mg L^{-1} and 2453 mg L^{-1}. The emission intensities of reactive species N, N_2*, N_2+,•OH, •H, and •O at an optimal rate of 0.8 L men^{-1} 400 W 700 V in 20139 au, 28540 au, 18023 au, 30863 au, 12547 au, 49800 au. The addition of air injection will increase the oxygen input into the plasma zone, which can produce reactive species •O and nitrogen produces reactive species N, N_2*, N_2^+ forms NO. The formed NO compounds can be oxidized to NO_2, and the reaction between NO_2 and reactive species •OH forms nitrates.