Paper (6)

Parametric study and experimental investigation of hydroxy (HHO) production using dry cell

M.A. El Kady[a], Ahmed El Fatih Farrag[b], M.S. Gad[c], A.K. El Soly[d], H.M. Abu Hashish[e]

[a,d]Mechanical Engineering Department, Faculty of Engineering, Al Azhar University, Egypt
[b,c]Mechanical Engineering Department, National Research Centre, Egypt
[c]Mechanical Engineering Department, Faculty of Engineering, Fayoum University, Egypt
Fuel, Vol. 282, 118825.

Abstract

The aim of the paper is to redesign and fabricate of hydroxy (HHO) dry cell to produce the maximum gas flow rate and enhance the electrolyser efficiency. HHO was produced by water electrolysis in parallel stainless steel 316 L plates (130 × 105 mm^2), gasket of 3 mm thickness using different concentrations of NaOH and KOH Effects of flow current, voltage, electrolyte concentration, temperature, operating time and electrolyte types on HHO flow rate were studied. The voltage increase from 2 to 4 VDC led to the electrolyser efficiency increase to 51. 12% but after that it was decreased. The applied voltage increase from 2 to 11 VDC increased the HHO flow rate from 110 to 450 ml/min. The current increase from 6 to 14 A, produced the electrolyser efficiency of 72.9% and decreased after that. The current increase from 6 to 42 A, led the actual flow rate increase from 137 to 654 ml/min. After operating time of 30 min., the HHO flow rate reached the highest stable values of 866, 985, 1040 and 1090 ml/min at 5, 10, 15 and 20 g NaOH concentrations, respectively. The temperatures were increased to 32, 38, 44 and 52 °C at 10, 15 and 20 g NaOH concentrations, respectively, and remained constant.The electrolyte concentration of 5 g NaOH in cell configuration [4C3A19N] and supplied current of 14 A led to the highest HHO productivity of 866 ml/min and electrolyser efficiency of 72.1%. HHO dry cell is economical and efficient to be applied to the engine.