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Dry Methane Reforming by Atmospheric Pressure Glow Discharge Plasma Reactor PARINAZ SAADAT ESBAH TABAEI, Sint-Pietersnieuwstraat 41, B4, applied physics 41 9000 Gent, MAHMOOD GHOANNEVISS, Plasma Physics Research Center, Science and Research Branch, Azad University, Tehran, Iran, HAMIDREZA BOZORGZADEH, Research Institute of Petroleum Industry, Tehran, Iran — Dry methane reforming to produce syngas by glow discharge plasma at the atmospheric pressure has been investigated. In this study the reactor was especially designed to have the advantage of the large treatment area because of the high electrode distance (2-2.5 cm) to initiate the uniform discharge inside the plasma reactor. The effects of feed flow rate and electrode distance on methane and carbon dioxide conversion and CO and H_2 selectivity were studied. The experiment was operated in the input power of 22 W, the total feed flow rate from 60 ml/min to 150 ml/min, electrode distance 2 cm and 2.5 cm and the molar ratio of CO_2/CH_4 =3. At the constant voltage of V=10 kV the best results for conversion of CH_4 and CO_2 were 75% and 37.02%, respectively. The effect of voltage in the range from 10 kV to 18 kV by constant parameters such as (F=30 kHz, molar ratio of CO_2/CH_4 =3, feed flow rate= 60ml/min and electrode distance d=2 cm) shows that the considerable results for methane and carbon dioxide conversion were 87.6% and 46.3%; for CO and H_2 selectivity, were 70% and 30%, respectively. The efficiency of plasma method was achieved 54% under the conditions of CO_2/CH_4 =3, feed gases flow rate 60ml/min, electrode distance 2(cm), applied voltage 10 (kV), and input power 22(w).

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