

Hydrogen production from alternative aqueous sources: A feasibility study

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Deskripsi Lengkap: <https://lib.ui.ac.id/detail?id=9999920533979&lokasi=lokal>

Abstrak

This paper presents the production of hydrogen from various aqueous sources (de-ionized water, fufu effluent, sea water, run-off water, tap water, and urine). Two sets of hydrolysis experiments (with and without the dissolution of NaCl (35 g/l) into the aqueous media) were conducted using 12 V (DC supply) with graphite electrodes. The current utilized and volume of hydrogen produced was measured, while hydrogen flow rate, power, and effectiveness were estimated. The significance of the addition of NaCl to the aqueous media was analyzed using a t-test. It was observed that the dissolution of NaCl into the aqueous media had an appreciable effect on the values of pH, volume and flow rate of hydrogen produced, current utilized, power consumed, and effectiveness compared to the values obtained without NaCl dissolution. This was corroborated by the result of the t-test ($t_{critical} (2.0452) < t_{observed} (4.1139)$ with a p-value of 0.0032 at 95% confidence interval), indicating the significance of the dissolution of NaCl into the media. The results showed that urine, followed by sea water, fufu effluent, run-off water, tap water, and de-ionized water, had the highest volume and flow rate of hydrogen, whereas the value of effectiveness was highest for de-ionized water, followed by tap water, sea water, urine, fufu effluent, and run-off water. Run-off water and fufu effluent were also demonstrated to be potential sources of hydrogen production outside urine and sea water.