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The Impact of an Ionic Liquid on Hydrogen Generation from a Redox Process Involving Magnesium and Acidic Oilfield Water

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Abstract : Under various conditions, we present a promising method for producing pure hydrogen energy from the electrochemical reaction of Mg metal in waste oilfield water (WOW). Mg metal and WOW are primarily consumed in this process. The results show that the hydrogen gas output is highly dependent on temperature and solution pH. The best conditions for hydrogen production were found to be a low pH (2.5) and a high temperature (338 K). For the first time, the Allyl methylimidazolium bis-trifluoromethyl sulfonyl imide) (IL) ionic liquid is used to regulate the rate of hydrogen generation. It has been confirmed that increasing the solution temperature and decreasing the solution pH accelerates Mg dissolution and produces more hydrogen per unit of time. The adsorption of IL on the active sites of the Mg surface is unrestricted by mixing physical and chemical orientation. Inspections using scanning electron microscopy (SEM), energy dispersive X-ray (EDX), and FT-IR spectroscopy were used to identify and characterise surface corrosion of Mg in WOW. This process is also completely safe and can create energy on demand.

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