

Simulation Study and Economic Analysis on Sulfur Iodine Cycle for Hydrogen Production

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Hydrogen is the promising candidate for the future alternative energy carrier. The Sulfur-iodine (SI) cycle is one of the most leading thermo-chemical water splitting technologies for massive hydrogen production. SI cycle consists of three reactions. Sulfuric acid and hydrogen iodide is produced in the Bunsen reaction. The products of Bunsen are separated into two liquid layers which are HIX phase consisting of HI, I<sub>2</sub>, H<sub>2</sub>O, SA phase consisting of H<sub>2</sub>SO<sub>4</sub> and H<sub>2</sub>O. The Bunsen reaction is intermediate step in which products from decomposition steps recycle back as reactants in Bunsen reaction. SO<sub>2</sub> from sulfuric acid decomposition I<sub>2</sub> and H<sub>2</sub>O from HI decomposition recycle back to Bunsen process. However, the conventional process uses excess iodine for spontaneous liquid-liquid separation. Applying purification column can solve the problem by reducing iodine. The economic analysis on conventional process and the process with purification column were carried out to confirm profitability.