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Developing and optimizing a new cogeneration cycle to produce hydrogen from seawater

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Abstract

Global warming and the depletion of fossil fuels have driven countries to develop alternative fuel strategies. As an alternative fuel, hydrogen is very attractive since it has a high thermal energy and near-zero emissions. This paper proposes a new arrangement of the cogeneration cycle for hydrogen production from seawater is proposed and optimized via the multi-objective swarm optimization (MOPSO) algorithm. In this survey, hydrogen is produced through the electrochemical cycle Copper-Chloride (Cu-Cl), using the heat and electricity provided via waste heat recovery of a gas cycle. A reverse osmosis system provides drinking water for the Cu-Cl cycle. This cycle can produce 256 GWh of electricity and 23616 tons/year of hydrogen during a year. This cycle's first and second law efficiencies are 35.3 % and 7.2 %. Based on the financial aspects, this cycle's investment return time equals 4.1 years. By using MOPSO algorithm, the exergy efficiency