
Using of produced water associated with oil and gas production as a source of hydrogen: solar electrolysis cell application

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Abstract In frame of the growing global concerns regarding to the high extent of environmental pollution and its serious consequences on the future of the planet. The seek out for a proper source of clean energy is considered to be a top priority. Where a substantial reduction in a present reliance on fossil fuels is achieved. This objective can not be factual without intensive efforts to find out the appropriate alternative, which are the sustainable and environmentally friendly energy alternatives. The use of hydrogen as an alternative fuel is gaining more and more acceptance as the environmental impact of hydrocarbons becomes more evident. The using of enormous amount of a polluted produced water associated oil and gas production activities to generate the hydrogen by solar hydrolysis cell, is considered to be a multi advantages alternative, where the volume of polluted and environmentally risky water been reduced and a significant volume of hydrogen been gained.

This work is an attempt to design of a hydrogen generating station by water electrolysis whose energy resources are solar. The electricity supply is done by photovoltaic cells. The novelty of this work is the using of produced water to generate a clean energy (hydrogen), and in the same time reducing the threats caused by the disposal pits of the vast volume of the produced water at oilfields, which is the biggest challenge to the oil industry and the environment. In this work, the produced water has been electrolyzed by using solar energy. Standard chemical analyses methods have followed to determine the pollutants constitutes in this water. A pilot plant of solar hydrogen production unit has been built consisting of; solar photovoltaic cells, water electrolyzer, and hydrogen and oxygen gas storages. The hydrogen production rate is given for various values of the solar radiation during the year in-site of the oil production field in Libya.

Keywords: hydrogen from solar energy, water electrolysis, photovoltaic, produced water.
