

High temperature gas-cooled reactor hydrogen production and energy storage

Can high-temperature gas-cooled reactor produce hydrogen?

Sakaba, N. et al. (2008), "Hydrogen production by high-temperature gas-cooled reactor. Conceptual design of advanced process heat exchangers of the HTTR-IS hydrogen production system", Nippon-Genshiryoku-Gakkai-Wabun-Ronbunshi, 7(3), 242-256. Science Direct Database (2001-2010).

Are HTGR reactors suitable for nuclear hydrogen production?

HTGR is another reactor type with great potential for development and are considered the most suitable for hydrogen production due to high exit temperatures and their inherent safety features [19]. However, there are few studies on the evaluation of nuclear hydrogen production related to HTGR.

Can a high temperature gas cooled nuclear reactor be combined with SOE?

Coupling of high temperature gas-cooled nuclear reactors with SOE was studied. Power load of the HTGR was modulated between 25% and 100%. Current density of electrolysis was adjusted to control the process. The maximum amount of hydrogen produced hourly was 2,800 tons. Efficiency of SOE in the system varied between 49.86 and 89.11%.

Which type of nuclear reactor is used for hydrogen production?

Most of the reported studies have adopted SCWR as the nuclear reactor type used for the system. HTGR is another reactor type with great potential for development and are considered the most suitable for hydrogen production due to high exit temperatures and their inherent safety features [19].

Why should the operating temperature of a nuclear reactor be increased?

Moreover, the main incentive for increasing the operating temperature is the possible use of the reactor heat generation for hydrogen production from water splitting through high temperature processes (either a thermo-chemical process or high temperature electrolysis), the efficiency of which drastically increases above 900°C.

Can nuclear heat be used for hydrogen production?

Elder, R. and Ray, A. (2009), "Nuclear heat for hydrogen production: coupling a very high/high temperature reactor to a hydrogen production plant", Prog. Nucl. Energy, 51, 500-25.

high-temperature heat for thermal processes for producing hydrogen. The GT-MGR reactor - an innovative international modular design of a helium-cooled reactor with a ...

Nuclear power will play a significant part in the world's energy supply throughout the next century. Decreasing supplies of fossil fuels, along side increasing instability in their ...

An advanced molten-salt or high-temperature gas-cooled reactor could effectively provide this heat duty. ...

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hydrogen storage for delayed power production using a combination ...

Based on the experience of HTR-10 and extensive engineering development of the reactor components, China is constructing the world's first prototype modular reactor plant ...

In the US, the Next Generation Nuclear Plant (NGNP) project was mandated by the US Energy Policy Act of August 8, 2005 as a high-temperature gas-cooled reactor intended for ...

Generally, NPPs can be divided into four generations (Alameri & Alkaabi, 2020). The first-generation reactors refer to early prototype reactors and demonstration reactors, such as ...

"Nuclear power is one of the most promising approaches for efficient, massive and CO₂-free hydrogen production," said Mikhail Chudakov, IAEA Deputy Director General and Head of the Department of Nuclear ...

feasible than other alternative technologies for nuclear hydrogen production ~such as high-temperature sulfur processes!, especially over an intermediate temperature ...

And even if it is not, energy is wasted when production efficiency is low. In fact, Japan has developed hydrogen production technology that overcomes these drawbacks. The high-temperature gas-cooled reactor ...

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Next Generation Nuclear Plant (NGNP) Mission and Program Objectives Mission: Demonstrate high-temperature gas-cooled reactor (HTGR) technology to produce electricity ...

NGNP Concept for Large-Scale Centralized Nuclear Hydrogen Production based on High-Temperature Steam Electrolysis NGNP / HTSE Conceptual Design Direct coupled to ...

Nuclear energy, as a near-zero emission energy source, can provide an important solution for clean, efficient, and stable hydrogen production [9]. The very-high-temperature gas ...

sustainable nuclear energy is of paramount importance to the IAEA. Significant efforts are underway in several Member States to develop high temperature gas cooled ...

High temperature: can provide heat (700~950°C) that meets the temperature need of advanced CO₂-free hydrogen technologies. Inherent safety: catastrophe-free, easily ...

hydrogen, and expectations for highly efficient hydrogen production using CO₂-free high-temperature heat

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from High-Temperature Gas-cooled Reactors (hereafter referred to ...

A nuclear reactor plant with a high-temperature gas-cooled reactor (HTGR NPEP) represents the optimal option for combining with hydrogen production due to a high level of ...

Of the many ways an HTGR can be applied to a chemical process to produce hydrogen, two are discussed in detail herein. One is for steam hydrocarbon reforming, which might be considered ...

To enrich the existing research methods and content, two improved very high temperature gas-cooled reactor and iodine-sulfur (I-S) cycle-based nuclear hydrogen and ...

In order to structurally diversify the energy sector and transit to carbon-free development, R& D of nuclear hydrogen technologies for the large-scale production and ...

The process relies on advanced nuclear reactors capable of delivering very high heat, such as high-temperature gas-cooled reactors (HTGRs) or molten salt reactors (MSRs). This method bypasses the inefficiencies of ...

Internationally, there are only two high temperature systems under consideration: high temperature gas-cooled reactor systems (HTGR) and molten salt reactors (MSRs). Seven ...

12.2.3 Indian high temperature reactors. High temperature reactor [31-34] development work is in progress in India. The basic objective is to develop reactors with high thermal to electrical ...

It is a helium-gas cooled, graphite-moderated, thermal neutron spectrum reactor, which can provide electricity and process heat for wide-ranging applications, including ...

The next generation advanced nuclear reactors will likely have an outlet temperature of about 700-850 °C for the first of a kind, further increased to 900-1000 °C for ...

The SOEC method electrolyzes high-temperature steam to produce hydrogen, which is suitable for high-efficiency, large-capacity hydrogen production. The typical SOEC ...

This pebble bed, high-temperature gas-cooled reactor can't melt down, according to X-energy. ... efficiency, and economics to the nuclear energy industry. X-energy, located just outside the nation's capital in Rockville, ...

Nuclear hydrogen production: considered as a clean substitute for fossil fuels oTo provide electricity + heat with no CO₂ emissions oHydrogen production in centralized, large ...

An improved very high temperature gas-cooled reactor (VHTR) and copper-chlorine (Cu-Cl) cycle-based

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nuclear hydrogen production system is proposed and investigated in this ...

Modular high-temperature gas-cooled reactor (MHTGR) is a highly regarded generation IV nuclear energy system because of its safety and high exit temperature. Shidao ...

US research groups have intensively worked on High Temperature Gas Cooled Reactors (HTGR) for the sulfur iodine (S-I) cycle. The development of high efficiency, high ...

The high-temperature gas-cooled reactors (HTGR) use helium gas at about 800 °C and 5 MPa (685 psi) as the primary coolant, graphite as the neutron moderator and fuel element structural ...

Web: <https://www.eastcoastpower.co.za>

