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News

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Francophone researchers studying hydrogen in the underground environment met in Bordeaux November 9th and 10th to discuss their results and to signal the start of the HydroGEMM research group. The objective of this group is to develop understanding of the origin of subsurface hydrogen and to provide detailed mathematical models explaining its behaviour when it interacts with the environment during subterranean migration.

Hydrogen has extraordinary chemical energy and is destined to play a major role in the decarbonization of industry and transportation. 95% of the hydrogen that is currently used in industry comes from the transformation of fossil fuels, with almost half coming from natural gas, and steam reforming, the process used in the transformation, emits large quantities of CO_2 into the atmosphere if it is not captured. Nonetheless, it is

hoped that in the near future hydrogen will be produced by electrolysis, which, if the electricity employed is of sustainable or nuclear origin, will ensure a decarbonized energy vector. And if hydrogen can be directly extracted from the ground, like oil, it will mean a cheap supply of this precious molecule. Recent discoveries in Brazil, Russia and Africa are fuelling the hope that we will be able to access sources of natural hydrogen. But these discoveries are rare, and do not enable us to foresee large-scale development. Regardless, the question of natural hydrogen remains open and must be, at the least, explored so that we can study the possibility of storing hydrogen in salt caverns, in particular to supply future hydrogen distribution networks.

The HydroGEMM research group is tackling the problem of subsurface hydrogen

The HydroGEMM (subsurface Hydrogen: integrated study of its GEnesis using Mathematical Modelling) research group was established by a consortium of research laboratories to develop understanding of the origin of subsurface hydrogen (natural H2) and to improve the mathematical models that describe its behaviour during subterranean migration and when it interacts with the environment. On November 9th and 10th, the consortium met for the first time on the premises of ENSEGID – Bordeaux INP and the Saint-Emilion town hall to discuss a number of themes:

- hydrogen flow production in sedimentary basins through different phenomena, including serpentinization (oxydation of ferrous iron into ferric iron and mineral hydration), the radiolysis of water (uranium, thorium, potassium) and the very late maturation of organic matter,
- reactive transport,
- assessment of resources,
- hydrogen storage.

A theme that is mobilizing IFPEN researchers

IFPEN is undertaking a range of actions to improve our understanding of the different aspects of hydrogen. While the large-scale use of natural hydrogen does not yet seem feasible, it is nonetheless important to learn the mechanisms that bring the molecule from the Earth's crust, whether they be biological or physical-chemical in nature. And is it so far-fetched to imagine that it will one day be possible to reproduce these mechanisms in the laboratory, and draw upon them to develop processes to generate hydrogen? In any event, to answer the hope this new energy vector has generated and to overcome the many technological obstacles that remain, in order to make hydrogen one of the main decarbonized energies of tomorrow, significant research still lies ahead. Will we one day learn to control this molecule, which has so many advantages to offer?

Scientific committee: currently being finalized. Includes IFPEN.
Steering committee: CNRS, INSU, INSIS, INSMI, currently being finalized
Members: Teréga, Storengy, TotalEnergies, Institut Carnot ISIFor

Programme of the opening conference of the research group

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HydroGEMM: researchers dive into subsurface hydrogen
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