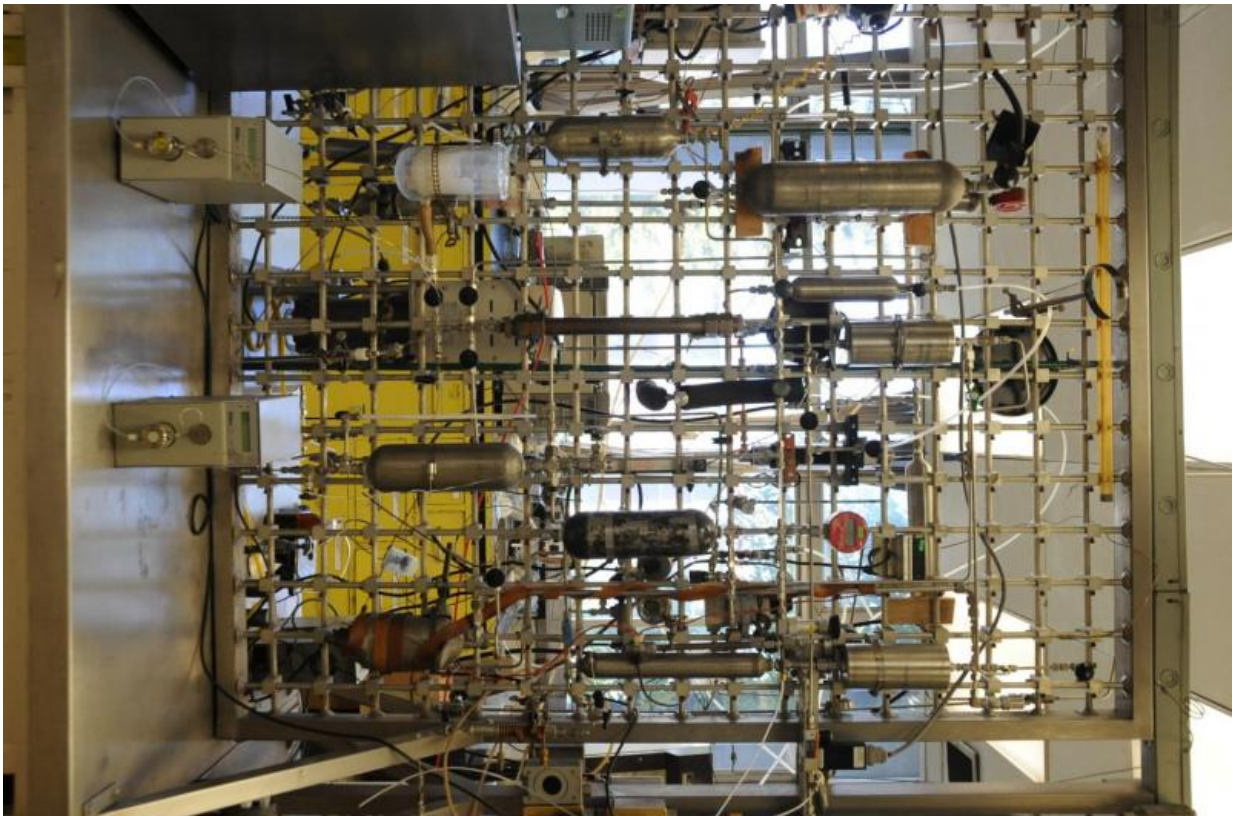


New material substantially reduces nitrogen from diesel

February 3 2016



Laboratory research equipment

The Mexican Oil Institute (IMP) developed a catalyst adsorbent material that removes 80 percent of organic compounds from hydrocarbon charges before starting the process of hydrodesulfurization (removing

sulfur from the hydrocarbon). It also allows Pemex to generate ultra low sulfur diesel (ULSD) more quickly and cheaply.

Its use in a preliminary process will increase the life of the catalyst for up to 30 months over current standards by avoiding [high temperatures](#) and pressures during operation in the reactor.

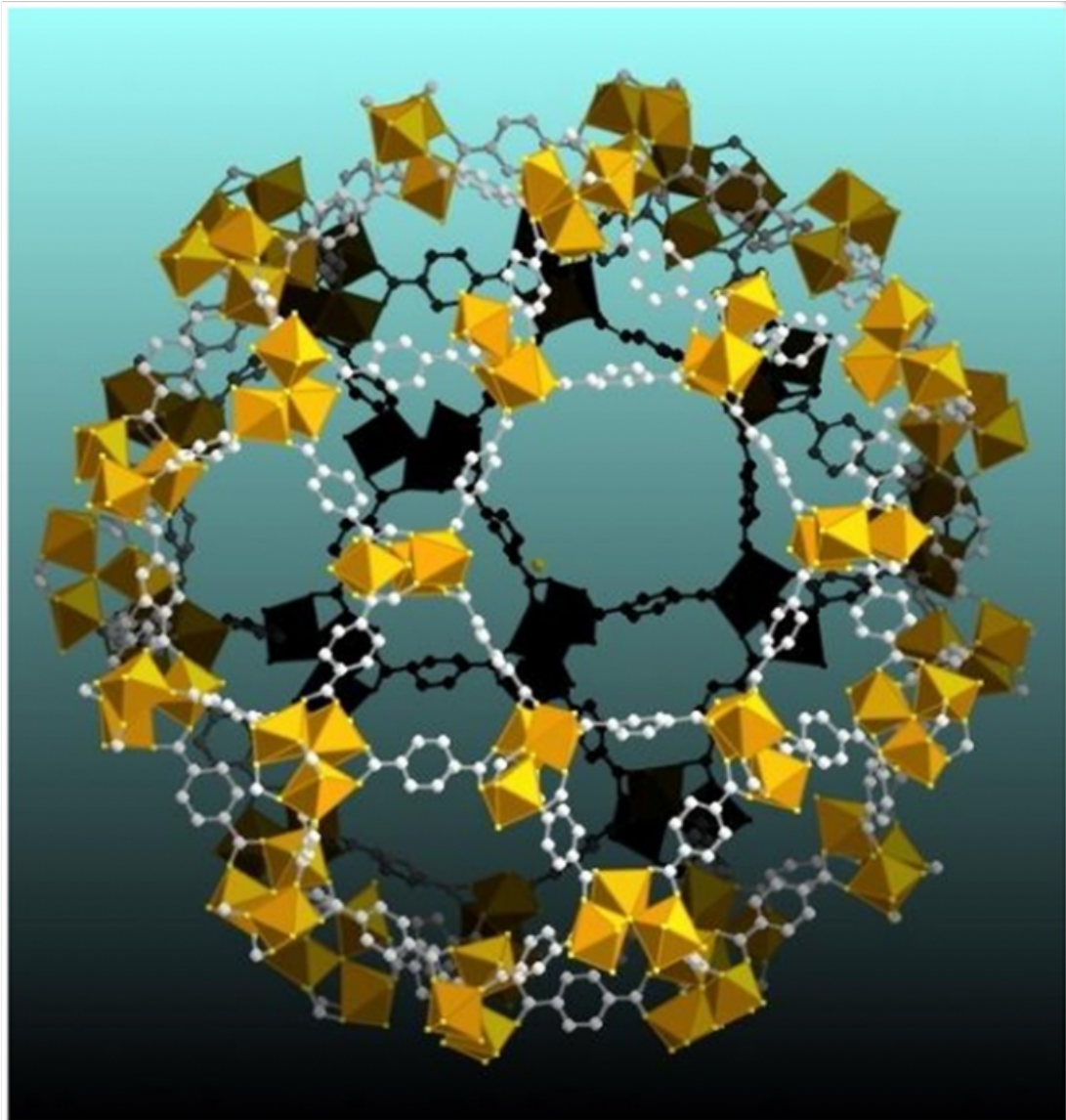
Doctor in chemical engineering Rodolfo Mora, head of the project, said that the research was initiated by the need of Pemex to convert its production of diesel from 500 parts per million (ppm) of sulfur to ULSD of only 15 ppm, which benefits the environment.

"There are different methods; however, most are slow and catalysts deactivate with time, so we had the need to remove the nitrogen from the load before it entered the units."

The specialist explains that with this material they seek to eliminate the organic nitrogen compounds found in crude oil, as these are strong inhibitors of the hydrodesulfurization process, so by reducing its content production is facilitated and it becomes more profitable.

During the first stage of the research, several Mexican institutions provided different materials (130 in total) to evaluate their [adsorption capacity](#) and selectivity of [nitrogen compounds](#).

Material con Mejor Desempeño: IMP-MIL 101 (Cr)



Catalyst adsorbent material

In the end, the most viable was synthesized by the IMP (IMP-NitSorb), which met the specifications to remove 80 percent of nitrogen through a

simple and efficient process. Discovering different routes to prepare it originated several patent applications.

In order to conduct a cost-benefit study for Pemex, the impact of reducing nitrogen before hydrodesulfurization was measured.

"The adsorption process was applied to a load that had an original content of 458 ppm of nitrogen to obtain a product with 87 ppm. Both loads, treated and untreated, were subjected to the hydrodesulfurization process. The results show that under the same conditions, the treated load reduces the reactor temperature between 25 and 30 °C, which increases the service life of the catalyst over the standard 30 months.

During the adsorption [process](#) a waste of 26,000 ppm of [nitrogen](#) is obtained, which represents about one percent of treated load and for which alternative uses are being sought as the incorporation into the asphalt used in paving roads due to its low volatility," said the project leader.

Subsequently in pilot studies, it was discovered that the adsorbent material can treat between 200 and 250 barrels of load per ton of adsorbent in each cycle, which means that if its useful life is of one thousand cycles (three years) each ton can treat between 200,000 and 250,000 barrels.

Currently the team is working on scaling the development to an industrial level, which is expected to be operational in a year and a half.

Provided by Investigación y Desarrollo

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