



**IONEX® TYPE
OP CATALYST
ORTHO TO PARA
CATALYST FOR
HYDROGEN LIQUEFACTION**

IONEX[®] TYPE OP CATALYST

Ionex[®] Type OP Catalyst rapidly converts ortho to para hydrogen during the liquefaction process to minimize liquid hydrogen boil-off during storage.

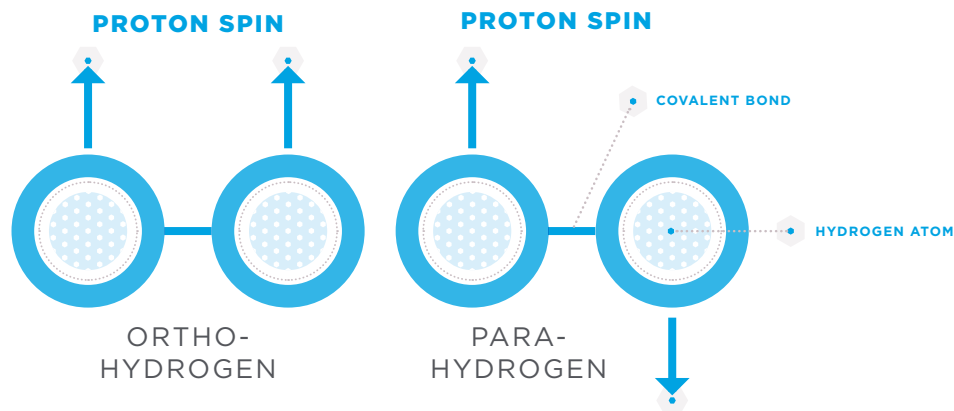
That's why market leading energy companies, hydrogen liquefaction equipment manufacturers and technology licensors rely on Ionex[®] Type OP Catalyst to protect LH₂ yields and maximize revenue.



CAUTION

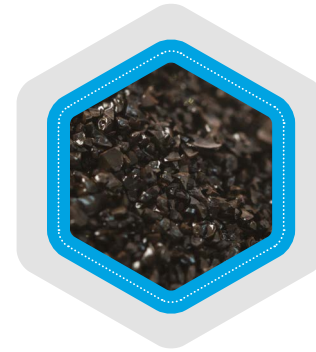
IONEX[®] TYPE OP CATALYST HOW IT WORKS

Ionex[®] Type OP Catalyst accelerates the spin isomer change from ortho to para hydrogen during liquefaction.



Fast catalysis during liquefaction ensures that only para hydrogen is present for storage. This results in less than 1% percent hydrogen loss per day in a well-insulated Dewar, compared to 18% per day without Ionex[®] Type OP Catalyst.

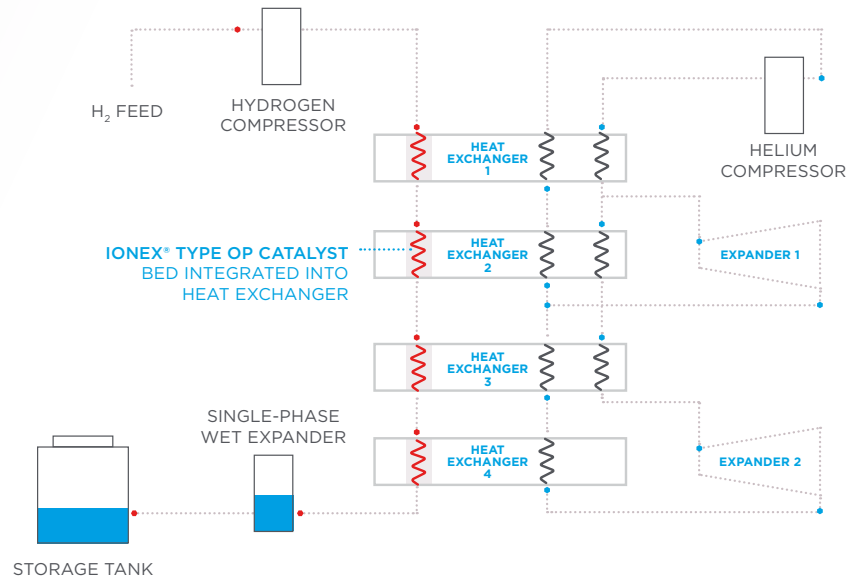
IONEX[®] TYPE OP CATALYST WHERE IT'S USED



Ionex[®] Type OP Catalyst is filled inside the heat exchanger to accelerate the catalytic conversion of ortho to para hydrogen.

The design of the ortho to para hydrogen heat exchanger and reactor vessel has significant impact on the efficiency and cost of the hydrogen liquefaction process.

- Cold hydrogen is passed through a column of Ionex[®] Type OP Catalyst
- Fast catalysis during liquefaction ensures only para hydrogen is present for storage
- This minimizes LH₂ boil-off during storage, as thermal energy is not evolved in the tank
- Resulting in maximal LH₂ yields



IONEX[®]

TYPE OP CATALYST

THE BENEFITS



MAXIMIZES YIELDS

Specifying Ionex[®] Type OP Catalyst into hydrogen liquefaction processes limits boil-off losses to 1% per day, compared to 18% without conversion

OUTSTANDING VALUE

Ionex[®] Type OP Catalyst is 7 times more efficient than supported chromium oxide¹ catalysts

PROVEN PERFORMANCE

Highly efficient liquefaction catalyst that will achieve 46.5% or higher of para hydrogen²

¹ Ortho-Parahydrogen Mixer, Catalysts, Measurement Devices and their Application, M Klaus et al 2019 IOP Conf. Ser.: Mater. Sci. Eng. 502 012161 and Catalytic ortho- to parahydrogen conversion in liquid hydrogen, Emil Karlsson ² When fed an equilibrium mixture of 75% ortho and 25% para hydrogen @1.36 atmospheres and 77 K, and a flow rate of 1200cc (STP) per minutes per cc of catalyst

OUR EXPERIENCE

Molecular Products specializes in highly technical chemical media solutions and has been supplying catalyst media for hydrogen liquefaction processes for over 20 years. Our global customer base is served from our two primary manufacturing facilities in the US and UK.

OUR CAPABILITY

With the growth of hydrogen production and use around the world, energy providers and hydrogen liquefaction equipment manufacturers depend on Ionex® Type OP Catalyst to optimize capacity and output.

Hydrogen

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