Compact Reforming Technology for Hydrogen

HCNG is the first intermediate step towards "Hydrogen Economy" and "Cleaner Environment" for urban cities.

IndianOil R&D has developed and patented a single-step compact reformer technology whereby H-CNG blends can be produced in-situ directly from CNG with reduced complexity & safety hazards of separate hydrogen production, compression & storage. Through this technology, HCNG production process is flexible (in terms of controlling percentage of hydrogen in HCNG blends) and robust, allowing production of HCNG in less severe conditions as compared to conventional reforming processes associated with hydrogen production. Demonstrations conducted at the International Centre for Automotive Technology (ICAT – an automotive testing and research centre located at Manesar near New Delhi) on buses running on HCNG showed a drastic reduction in mass emissions (in gm/km) - 77% in CO, 68% in total hydrocarbons and 53% in NOx – as compared to buses running on CNG near New Delhi.

Salient Features

- The Compact Reforming Technology yields higher quantity of HCNG mixture by 3-4% (by weight) as compared to the input quantity of CNG.
- HCNG product mixture can be directly used as automobile fuel after compression upto 200 bar.

Major benefits

- It eliminates the need for separate production, its compression and storage of pure Hydrogen.
- Process operates at mild operating conditions, thereby allowing use of relatively simpler and less expensive metallurgy. It employs simpler fixed bed reactor.
- CO is not present in reactor effluent and does not need further shift conversion.
- The process is capable of producing H-CNG mixture of desired composition for direct dispensing as automobile fuel.

Commercial Experience

- A compact reformer unit of 4 tonnes per day was set up in New Delhi to produce HCNG for field evaluation in a fleet of 50 Bharat Stage-IV compliant commercial CNG vehicles. The HCNG plant was started in mid-Oct 2020 and wide-scale demonstration trials were completed in April 2021. During this period, HCNG product quality was demonstrated at all capacities.

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