INNOMEM

Coke Oven gas and Blast Furnace Gas to HYdrogen (COHY)

THE OBJECTIVES

The main objectives of the COHY service are:

1. To demonstrate the effectiveness of a hydrogen-selective Molecular Sieving (MS) membrane with tailored nanopore sizes, compared to conventional Pd membrane technology.
2. To demonstrate the cost-effectiveness of a two-stage membrane-intensified unit, in comparison to conventional amine absorption technologies, for recovering CO_2 from BFG emissions.
3. To demonstrate the effectiveness of a water-selective Molecular Sieving (MS) membrane in shifting the equilibrium of CO_2 conversion, minimizing hydrogenation catalyst deactivation, and extending its life expectancy by two years.

COHY NANO ENABLED MEMBRANES

In COHY, three innovative membranes are being developed and demonstrated, namely: (a) oriented graphene oxide hollow fiber membranes with high CO_2 permeance (>700 GPU), (b) hydrogen-selective molecular sieving (MS) membranes, and (c) water-selective molecular sieving (MS) dehydration membranes.

COHY MEMBRANE INTENSIFIED PROCESSES

In the COHY project, three membrane-intensified processes have been recommended: (a) hybrid two-stage membrane/VPSA systems for the cost-effective recovery of CO_2 from KARDOKMAK's emissions, (b) high hydrogen-selectivity MS membranes for the cost-effective recovery of hydrogen from KARDOKMAK's COG emissions, and (c) water-selective molecular sieving (MS) membranes for the cost-effective hydrogenation of CO_2 to methanol.

CONCLUSION

The hydrogen-selective Molecular Sieving (MS) membrane offer superior $H2/CO_2$ selectivity and hydrogen permeance compared to conventional Pd membranes. Based on this, they can be used for producing hydrogen from KADOKMAK's COG emissions, instead of burning it.

The two-stage membrane-intensified unit is superior to conventional amine absorption technologies, being 50% less expensive for recovering CO_2 from BFG emissions.

Water-selective Molecular Sieving (MS) membranes are superior to conventional zeolitic and other membranes at high temperatures for shifting the equilibrium of CO_2 conversion and reducing the cost of producing readily transportable methanol.