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Multistage liquefaction technology for lignite and heavy oil upgrading

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Synfuels China is a technology provider. A novel multistage liquefaction technology has been developed by Synfuels China, in order to improve the efficiency of liquefaction for low-rank coals and heavy oil residuals. The multistage coal liquefaction process consists of two sub-processes. Low-rank coals or heavy oil residuals are first hydrolyzed in hydrogen atmosphere in a slurry-bed reactor under 4.0-5.0 MPa and 420-460°C by mixing the feedstock with certain high activity catalyst in a solvent with high hydrogen-donor ability. The residues from the hydro-pyrolysis process is then gasified to produce syngas. After being purified, the syngas is converted to liquid fuels using synfuels China proprietary High-Temperature Slurry Fischer-Tropsch Process (HTSFTP) technology, which has been successfully applied in two 4000 BPD CTL demonstration plants, running at full load for more than five years in China. Synfuels China has carried out comprehensive R&D work on the hydrogen-pyrolysis process, including studies on high-performance catalysts, hydrogen transfer mechanism, and the properties of feedstocks as well. For a typical heavy oil with a API of 9.9 and IBP of 211.4°C, the oil yield can be improved from the initial 35.8% (< 520°C) to ~85% (< 520°C) after the heavy oil feedstock is processed via the multistage liquefaction process (once-through only). For a typical brown coal, its conversion rate can reach 88-92%, and oil yield is up to 60.0% after the hydrogen-pyrolysis at ~4.0 MPa. This technology has been verified in our pilot plant with a capacity of 80 BPD.

Biography

Yongbin Cui has completed his PhD from The University of New South Wales. He is the Deputy Chief Engineer of Synfuels China Engineering Ltd. Synfuels China is a technology provider for Fisher-Tropsch synthesis and product upgrading technologies for coal-to-liquids and gas-to-liquids and heavy oil upgrading, and provide EPC services to its clients.

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