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Ionic liquid-based green process engineering for co-production of ethylene glycol and dimethyl carbonate



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Ethylene glycol (EG) as one of bulk chemicals and dimethyl carbonate (DMC) as environmental friendly chemical materials have strategic significance for the basic industries and new industries. The development of green process engineering for coproduction of EG and DMC is highly required as the conventional routes involve either high energy consumption or toxic material. The successful industrial ionic liquid-based green process engineering has several advantages. First, the supported ionic liquid based on synergistic catalytic effect in a fixed bed avoids energy consumption and the loss of catalyst, compared with traditional processes in which the separation of ethylene carbonate and catalyst cost a lot of energy. Second, reactive distillation breaks the equilibrium of the transesterification reaction and converts all ethylene carbonate, thereby improving conversion. This is more straightforward than using a series of fixed bed reactors and ethylene carbonate hydration reactor. Third, energy consumption is reduced (20%~30%) due to the heat integration system compared with traditional process of the coproduction of propylene glycol and dimethyl carbonate. Finally, CO₂ released from the upstream of ethylene oxidation plant is utilized in the new process, a big advantage from an ecological point of view, compared with traditional process of the hydration of ethylene oxide. This green chemical engineering technology has been pushed to commercialization. A 33,000 t/a, industrial plants are now successfully operating. Because of its economic cost and environmental benign, the new process is believed to be a competitive technology for producing ethylene glycol and dimethyl carbonate.

Biography

Weiguo Cheng has completed his PhD from Dalian University of Technology in 2005. He has been a Professor of Chemical Engineering at Institute of Process Engineering, Chinese Academy of Sciences since 2014. He is the Member of Committee of Integration of IT Application and Industrialization. He has published more than 50 papers in reputed journals and 19 invention patents granted including one PCT patent.

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