Selective Chlorination of Methane to Methyl Chloride Using Zeolite Catalysts with Controlled Surface Properties

권승돈, 박성현, 최유열, 임슬기, 나경수†
전남대학교
(kyungsu_na@chonnam.ac.kr†)

CH_4 chlorination is one of the energy-efficient conversion pathways of CH_4 using the reactive chlorine gas molecule, which produces various chlorinated methane products (i.e., CH_3Cl, CH_2Cl_2, $CHCl_3$, CCl_4). Among them, CH_3Cl has higher industrial value because it can be further used as an intermediate material that can be converted to olefin or hydrocarbon. For the selective production of CH_3Cl, CH_4 should be chlorinated by ion-mediated mechanism. This requires superacid catalysts that can induce polarization of chlorine molecules. In this work, ion-exchanged zeolites and hence having controlled surface acidity and polarity were investigated in CH_4 chlorination. The CH_3Cl yield was remarkably changed according to the cations on the zeolite surface, which could be correlated with chemical properties of elements such as electron affinity and standard reduction potential of elements exchanged in the zeolite framework, and also the calculated natural bond orbital charge of the exchanged elements. The details of CH_4 chlorination and the results are going to be discussed in this poster.