CATALYTIC COMBUSTION OF ACETONITRILE OVER COPPER-BASED CATALYSTS

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The acetonitrile (CH₃CN) is a gas present in the industrial exhaust plant in the acrylonitrile manufacturing and is classified as hazardous substance on environment, because easily decompose in compounds like HCN. Their effective removals by selective catalytic combustion (CH₃CN-SCC) using catalysts has shown good viability, once yields by-products like NOₓ (NO, NO₂) will be in low concentration and majority product found is N₂. In this study, Cu-BETA 24h, Cu-BETA 48h and CuO-BETA catalysts were investigated for CH₃CN-SCC with 24, 48 (ion exchange) and 1h (impregnation) of time preparation catalyst, respectively. The crystalline phases of the catalysts were studied by XRD, who confirmed CuO crystal phase over Beta zeolite. Reactions were performed in a fixed-bed flow reactor coupled a mass spectrometer to identified products. CuO-BETA catalyst (Figure 1) was more active because achieve full CH₃CN conversion in lower temperature and almost without the production of unwanted products (HCN and NOₓ) compared to Cu-BETA 24h and Cu-BETA 48h catalysts. These results showed that copper oxide species in structures were more effective for the CH₃CN-SCC reaction.

Figure 1. Catalytic reactions using different copper preparation over zeolites: CH₃CN conversion (A); products selectivity for CuO-Beta catalyst (B).