Gas-phase glycerol dehydration to produce acrolein using PO_4/Nb_2O_5 catalysts modified with activated carbon

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in this study, we synthesized 3wt% of activated carbon supported on phosphoric acid modified niobium oxide for gas-phase glycerol dehydration to figure out the addictive effects on the catalytic performance. The catalysts were characterized by N2 adsorption/Desorption, X-ray diffraction (XRD), NH3-Temprature Programmed Desorption (NH3-TPD), Fourier transform infrared spectroscopy (FT-IR). The amount of activated carbon was fixed at 3 wt% and phosphoric acid was 10 wt% and 20 wt% in niobium. As a result, the highest glycerol conversion was achieved over 20 wt% PO4/Nb2O5 with activated carbon under atmospheric pressure, feed rate of 0.1ml/min, WHSV of 17.6 g/g and temperature of 300 ℃. The results suggest that the optimal amount of phosphoric acid leads the catalyst to have appropriate acidity which is an important factor for gas-phase glycerol dehydration. And it is postulated that added activated carbon may countervail the decrease in surface area caused by phosphoric acid.