

The present invention relates to a catalyst comprising a phosphorus modified zeolite, said phosphorus modified zeolite having partly an ALPO structure, wherein, the catalyst comprises a F'-modified zeolite and a binder, the zeolite comprises at least one ten members ring in the structure, optionally the catalyst comprises one or more metal oxides, the ALPO structure is determined by a signal between 35-45 ppm in ²⁷Al MAS NMR spectrum. The present invention also relates to the use of the above catalyst wherein said catalyst is operated in presence of steam at high temperature, "high temperature" means above 300 °C and up to 800 °C. By way of example one can cite, the alcohol dehydration to convert at least an alcohol into the corresponding olefin, the olefin cracking to make lighter olefins, the MTO and the alkylation of aromatic compounds with olefins and/or alcohols to produce, by way of example, paraxylene, ethylbenzene, cumene etc.