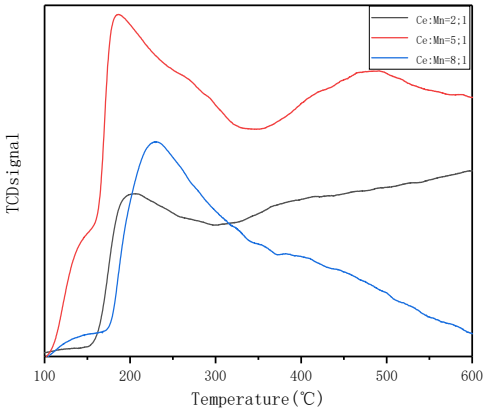
Catalyst desorption performance

In order to study the number of acid sites in the catalyst and its acid strength, the catalyst was characterized by NH_3-TPD. The desorption peak in the TPD curve corresponds to the acidic sites on the catalyst surface. It can be seen from Figure that the three catalysts all have ammonia desorption peaks at 125°C-550°C. According to literature reports, usually NH_3 binds to Brønsted acid sites and weak Lewis acid sites and desorbs before 200°C. The desorption peak in the range of 400°C is caused by the desorption of ammonia at the moderately acidic position.



NH_3-TPD graph with different Mn loads

NH_3-TPD Suction and desorption curve peak area

In varying proportions	Ce：Mn=2：1	Ce：Mn=5：1	Ce：Mn=8：1
Peak temperature(T/°C)	198、402	180、475	236、410
Peak area	65.24	136.90	72.38

The peak at 500°C is It is caused by the combination of ammonia and strong Lewis acid sites[16-17]. The position of the desorption peak reflects the strength of the acid site of the catalyst, and the peak area reflects the amount of ammonia adsorbed. It can be seen from the figure that when only Mn is loaded, the difference in the position and height of the catalyst peaks of different proportions is not only due to the difference in the loading amount. It may also be caused by changes in the thermal stability of adsorbed NH_3 substances[18]. From the figure, it can be seen that the catalyst with the ratio of Ce to Mn of 5:1 has the largest amount of ammonia adsorption and the most acid sites. It can be seen from Table 3 that the peak area is the largest and the desorption temperature is relatively low. The peak at 180°C is attributed to the desorption of the weakly adsorbed NH_3 from the Brønsted acid site and the desorption of the Lewis acid site. The peak at 475°C is attributed to the strong adsorption of

strongly adsorbed NH_3 at Brønsted acid sites and Lewis acid sites. The results of NH_3-TPD can also confirm that Ce: Mn=5:1 is the best load.