# Electronic supplementary information

for

## High pH promoting the synthesis of V-Silicalite-1 with high vanadium content in the framework and their catalytic performances on selective oxidation of styrene

**by**

Jing Zhao[1], Yifu Zhang [1,]*, Fuping Tian[1], Yi Zuo[2], Yang Mu[1], Changgong Meng[1]

[1] *School of Chemistry, Dalian University of Technology, Dalian 116024, PR China*

[2] *School of Chemical Engineering, Dalian University of Technology, Dalian 116024, PR China*

*Corresponding author. E-mail address: yfzhang@dlut.edu.cn

**Table S1**

Experiments of samples with different vanadium content in the system of fixing the amount of NaOH

| V/Si (n/n) | m ($VOSO_4$/g) | m (NaOH/g) | pH | Silicalite-1 |
|---|---|---|---|---|
| 0 | 0 | 0.06 | 9 | No |
| 0.02 | 0.10 | | 8-9 | No |
| 0.10 | 0.49 | | 7 | No |
| 0.20 | 0.98 | | 6 | No |
| 0 | 0 | 0.24 | 12 | Yes |
| 0.02 | 0.10 | | 11-12 | Yes |
| 0.10 | 0.49 | | 10 | No |
| 0.20 | 0.98 | | 9 | No |
| 0 | 0 | 0.79 | 14 | Yes |
| 0.02 | 0.10 | | 14 | Yes |
| 0.10 | 0.49 | | 14 | Yes |
| 0.20 | 0.98 | | 14 | Yes |

**Table S2**

Experiments about the synthesis of 0.20V-Silicalite-1 in different pH conditions

| V/Si (n/n) | m ($VOSO_4$/g) | m (NaOH/g) | pH | Silicalite-1 |
|---|---|---|---|---|
| 0.2 | 0.98 g | 0.41 | 11 | No |
| 0.2 | 0.98 g | 0.52 | 12 | Yes |
| 0.2 | 0.98 g | 0.62 | 13 | Yes |
| 0.2 | 0.98 g | 0.79 | 14 | Yes |

**Fig. S1**

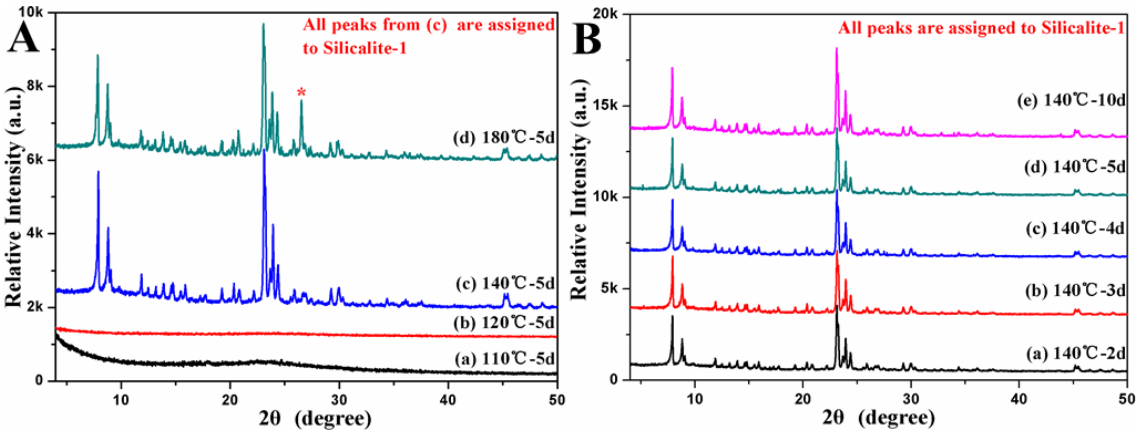


Fig. S1. XRD patterns of different temperatures and time.

**Fig. S2**

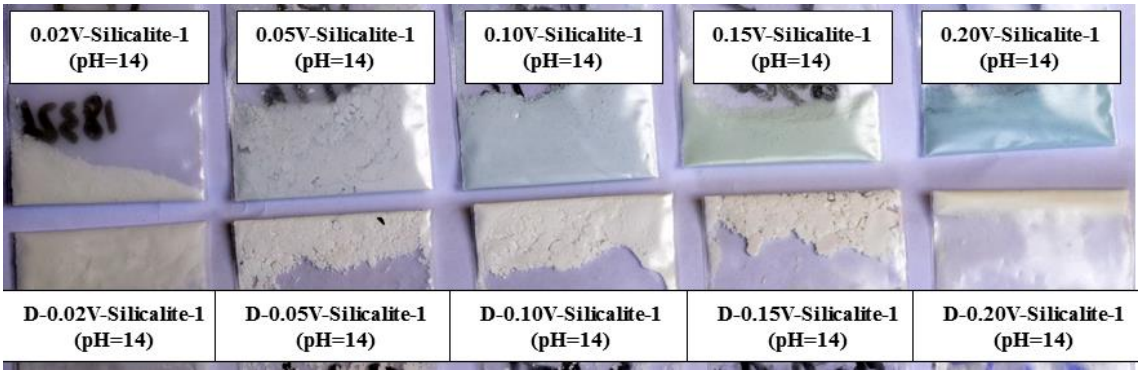


Fig. S2. Colors of the different vanadium content Silicalite-1 (before and after calcination) in conditions of pH=14

**Fig. S3**

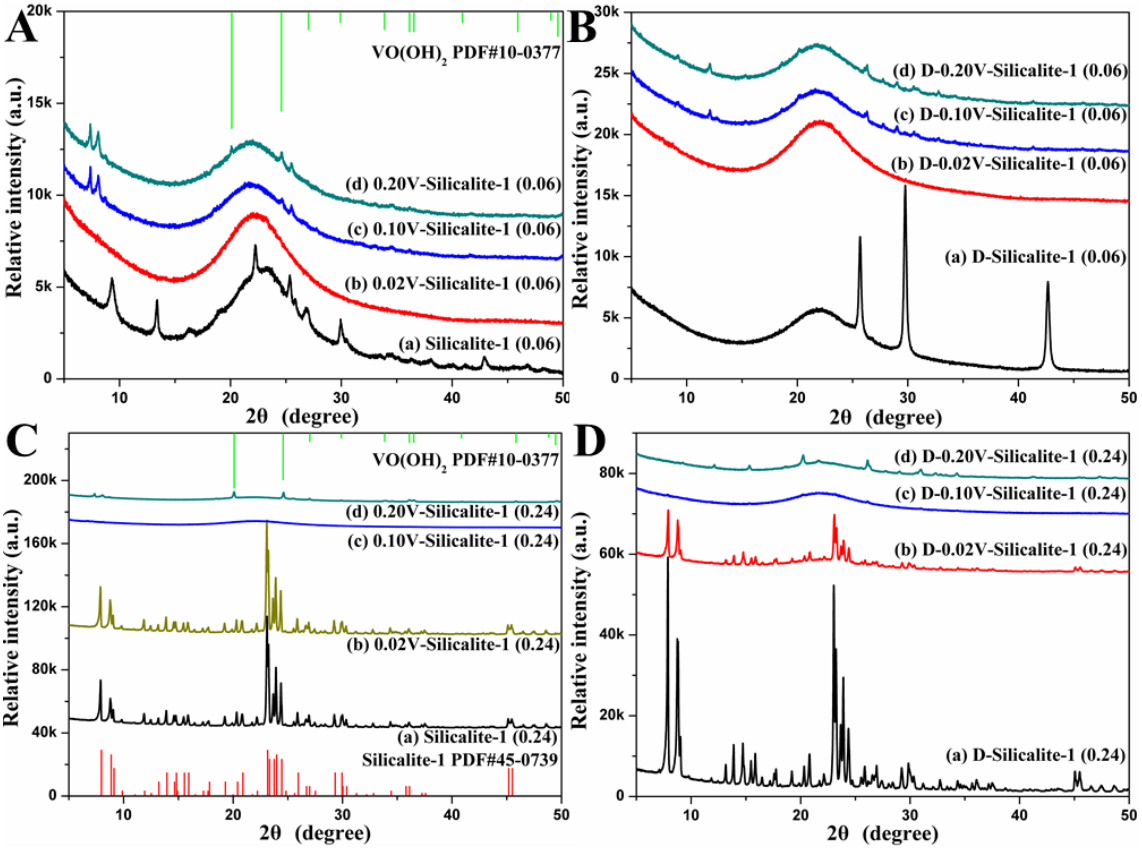


Fig. S3. XRD patterns of different amount of NaOH for the Silicalite-1 and V-Silicalite-1.

**Fig. S4**

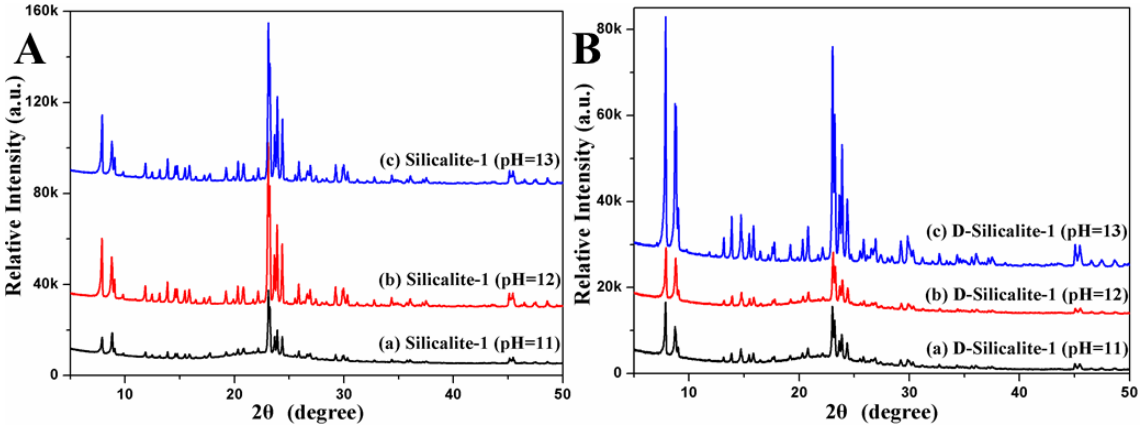


Fig. S4. XRD patterns of Silicalite-1 under different pH conditions.

**Fig. S5**


Fig. S5. Colors of the samples (before and after calcination) with different vanadium content in the system of 0.24 g NaOH.

**Fig. S6**

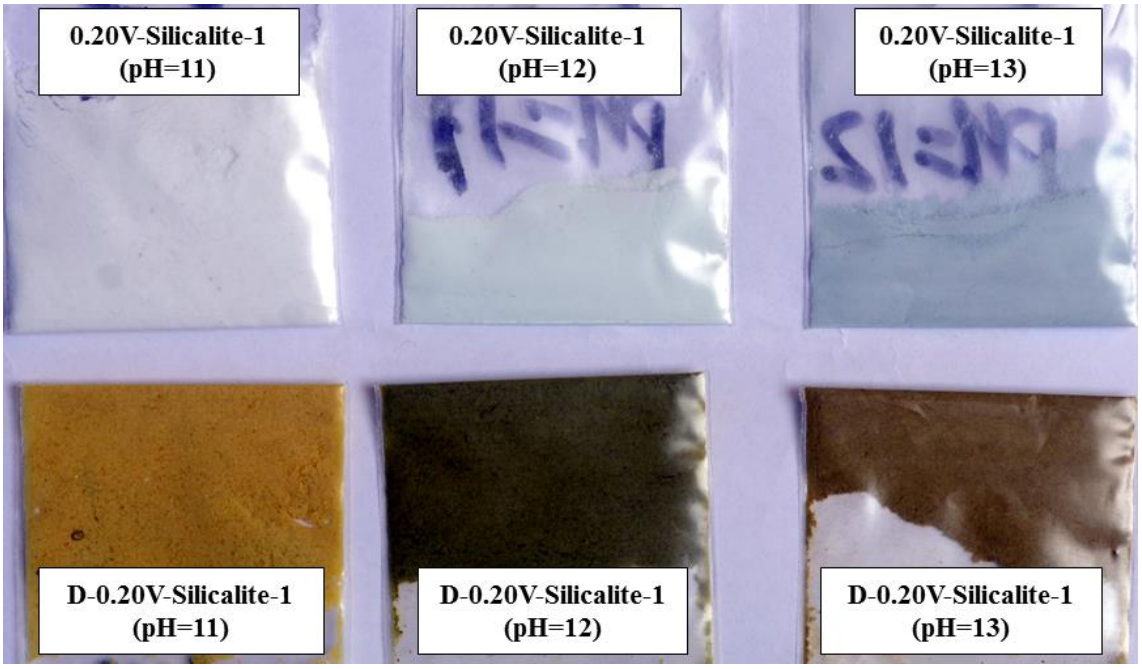


Fig. S6. Colors of the 0.20V-Silicalite-1 (before and after calcination) in different pH value conditions

**Fig. S7**

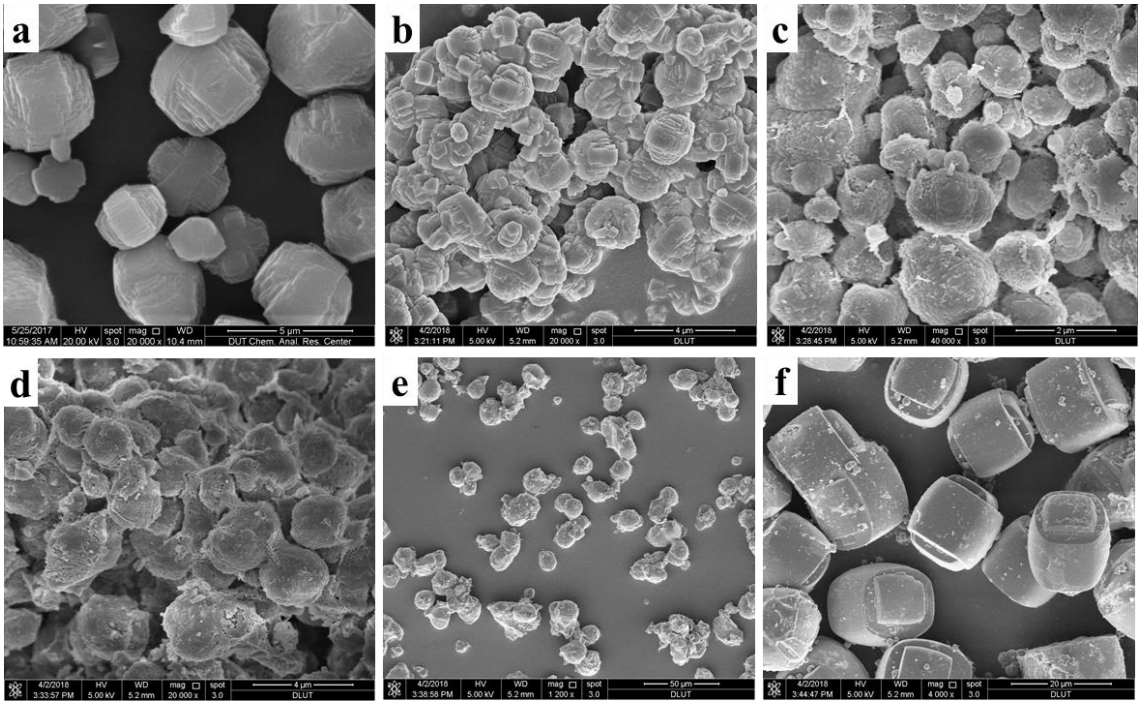


**Fig. S7.** FE-SEM images of D-Silicalite-1 (a) and D-V-Silicalite-1 (b-f) of different vanadium content.

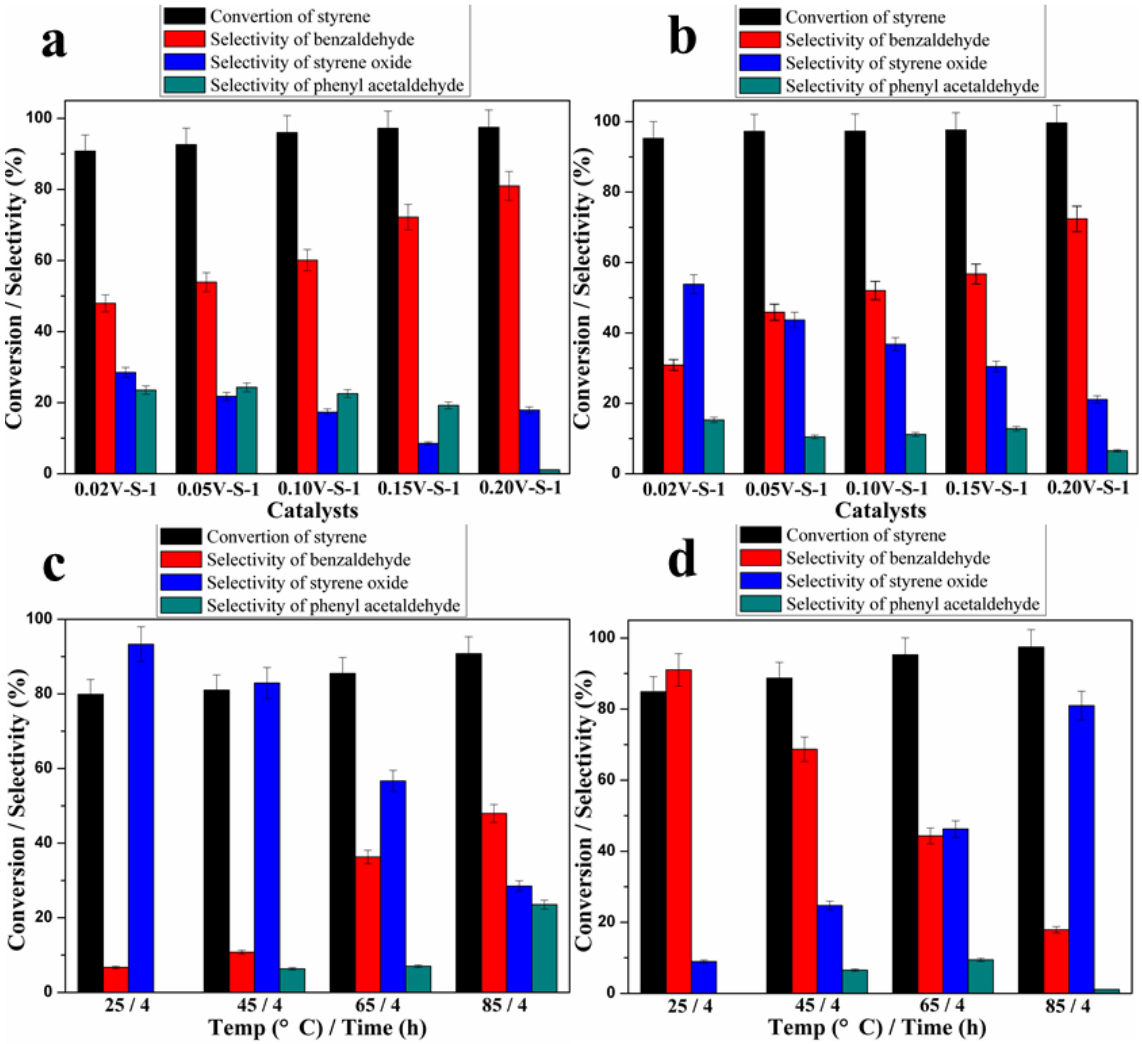


**Fig. S8.** The catalytic effects and the uncertainty of the conversions and selectivities (a) different catalysts at 85 ℃ for 4 h (b) different catalysts at 85 ℃ for 12 h (c) D-0.02V-Silicalite-1 at different temperatures for 4 h (d) D-20V-Silicalite-1 at different temperatures for 4 h.