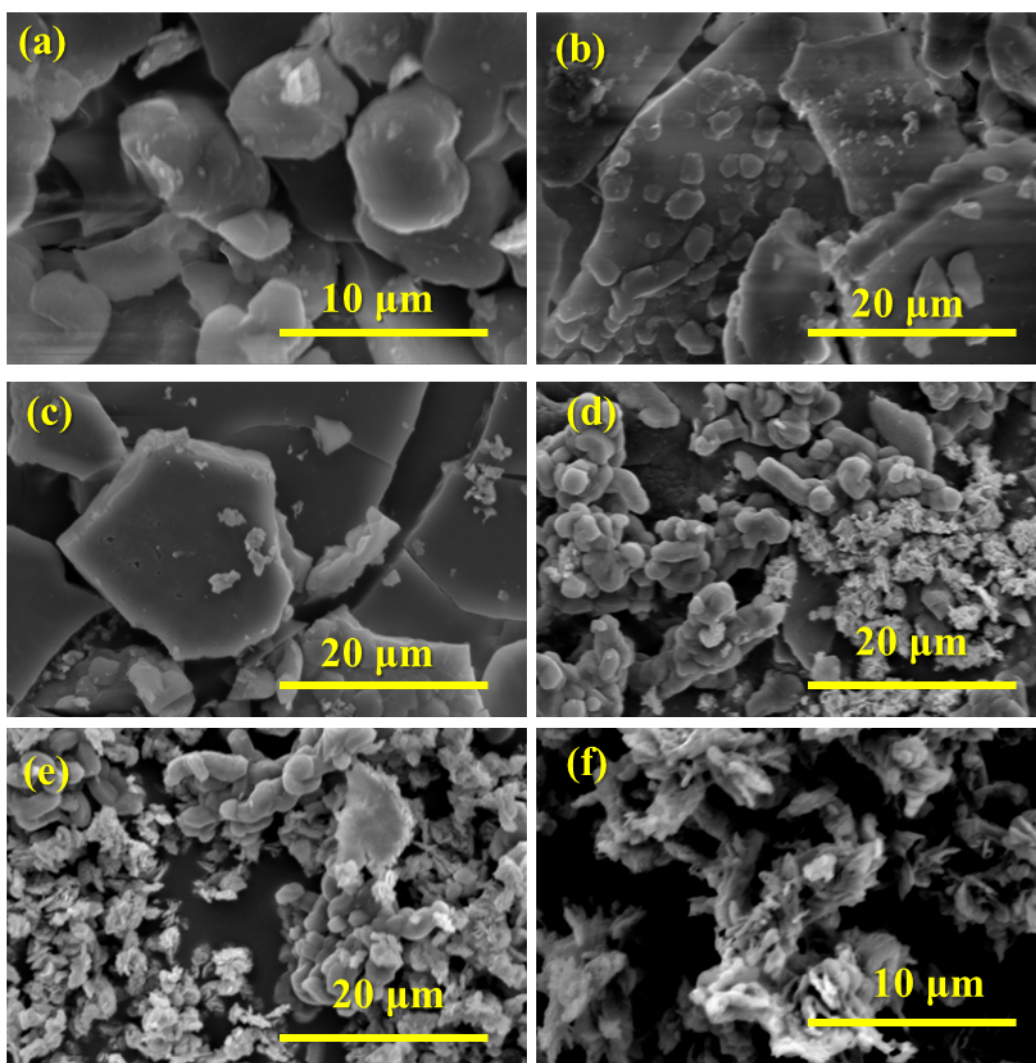


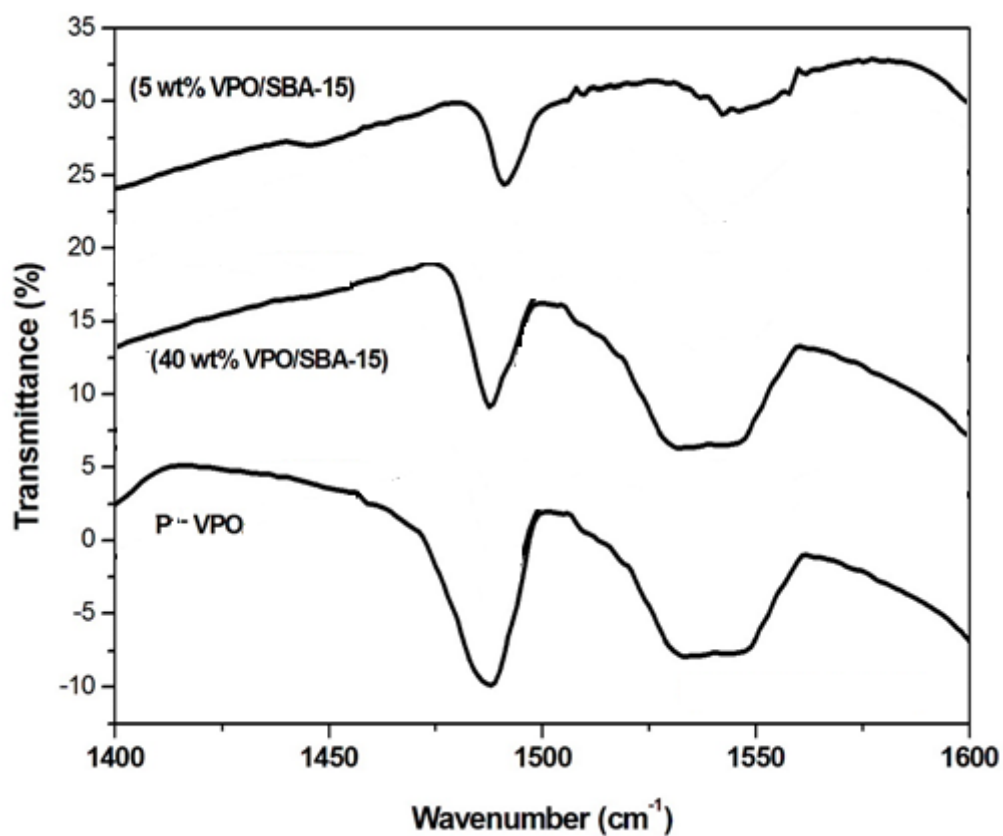
## Supplementary File

### Vanadium-phosphorous oxide supported on mesoporous SBA-15 catalysts for ammoxidation of toluene to benzonitrile

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**Figure S1:** SEM images of (a) pure SBA-15 (b) 10 wt% VPO/SBA-15 (c) 20 wt% VPO/SBA-15 (d) 40 wt% VPO/SBA-15 (e) 50 wt% VPO/SBA-15 (f) pure VPO



**Figure S2:** Ex-situ Pyridine adsorbed FT-IR images of pure VPO, 5wt% and 40 wt% VPO/SBA-15 samples.

Table S1: Comparison of catalytic activities with literature results

S.No	Catalyst	Reaction Conditions	Conversion	Selectivity
1	5% V <sub>2</sub> O <sub>5</sub> /TiO <sub>2</sub> -Nb <sub>2</sub> O <sub>5</sub>	Catalyst wt:0.5g, toluene: NH <sub>3</sub> : air= 1:13:26	85	90
2	5% V <sub>2</sub> O <sub>5</sub> /TiO <sub>2</sub> -SiO <sub>2</sub>	Catalyst wt:0.5g, toluene: NH <sub>3</sub> : air= 1:13:26	77	67
3	5% V <sub>2</sub> O <sub>5</sub> /TiO <sub>2</sub> -ZrO <sub>2</sub>	Catalyst wt:0.5g, toluene: NH <sub>3</sub> : air= 1:13:26	75	72
4	FeSiSbCrV	Temperature 400 °C, toluene: O <sub>2</sub> : ammonia = 0.110:0.078: 0.494 atm (partial pressure)	35	45
5	V-P-O/gamma-Al <sub>2</sub> O <sub>3</sub>	Weight:1g, toluene: air: ammonia : 1 ml h <sup>-1</sup> , 5.4 l h <sup>-1</sup> and 2.8 l h <sup>-1</sup> ,	64	100
6	10% Mo/Nb <sub>2</sub> O <sub>5</sub>	Catalyst wt:0.5g , Toluene:NH <sub>3</sub> :air = 1:14:30	65.2	71.2
7	10% Mo/TiO <sub>2</sub>	Catalyst wt:0.5g , Toluene:NH <sub>3</sub> :air = 1:14:30	56.2	74.0
8	10% Mo/ZrO <sub>2</sub>	T=400 °C, Catalyst wt:0.5g, Toluene:NH <sub>3</sub> :air = 1:14:30	64.0	68.4
9	W64V36	Catalyst wt:1.5g, toluene/NH <sub>3</sub> /O <sub>2</sub> /He = 1/10/4/34.	99.9	93.0
10	40wt%VPO/SBA-15	Catalyst wt:0.5g toluene:NH <sub>3</sub> :air = 1:7:30	92	98

Table S2: The results of percentage of V<sup>4+</sup>, V<sup>5+</sup> and the ratio of V<sup>5+</sup>/V<sup>4+</sup>

<b>VPO Loadings (wt %)</b>	<b>(a)</b>	<b>(b)</b>	<b>(c)</b>	<b>(%V<sup>5+</sup>)</b>	<b>(%V<sup>4+</sup>)</b>	<b>Ratio of (V<sup>5+</sup>/V<sup>4+</sup>)</b>
5	288	431	719	40.06	59.94	0.67
10	802	1092	1894	42.34	57.66	0.73
20	1628	1735	3363	48.41	51.59	0.94
30	2492	2364	4856	51.32	48.68	1.05
40	3087	3554	6641	46.48	53.52	0.87
50	1951	5237	7188	27.14	72.86	0.37
Pure VPO	1954	6053	8007	24.40	75.60	0.32

a-H<sub>2</sub> consumption (μ mol/g) related to V<sup>5+</sup>, b- H<sub>2</sub>consumption (μ mol/g) related to V<sup>4+</sup>,

C-Total H<sub>2</sub> consumption (μ mol/g)