Electronic Supplementary Material (ESI) for Green Chemistry.


# Highly chemoselective reduction of nitroarenes over non-noble metal nickel-molybdenum oxide catalysts

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## 1. Tables and Figures

### 1.1. Tables S1−S2

**Table S1. Textural properties of the prepared catalysts**

| Sample | $S_{BET}$ ($m^2\ g^{-1}$) | $V_p$ ($cm^3\ g^{-1}$) | $D_p$ (nm) | Ni crystallite size (nm) |
|---|---|---|---|---|
| SBA-15 | 678 | 0.95 | 5.5 | − |
| CN@SBA-15 | 358 | 0.55 | 5.2 | − |
| Ni/CN@SBA-15 | 339 | 0.46 | 4.8 | 22.4 |
| 6.0%$MoO_3$/CN@SBA-15 | 338 | 0.44 | 4.9 | − |
| Ni-1.5%$MoO_3$/CN@SBA-15 | 326 | 0.42 | 4.9 | 18.0 |
| Ni-3.0%$MoO_3$/CN@SBA-15 | 316 | 0.39 | 4.8 | 14.8 |
| Ni-4.5%$MoO_3$/CN@SBA-15 | 297 | 0.37 | 4.9 | 10.1 |
| Ni-6.0%$MoO_3$/CN@SBA-15 | 285 | 0.29 | 4.8 | 8.0 |
| Ni-7.5%$MoO_3$/CN@SBA-15 | 253 | 0.23 | 4.9 | 10.4 |

**Table S2. Actual composition of Mo, Ni, C, and N elements in the Ni-*x*$MoO_3$/CN@SBA-15 and $MoO_3$/CN@SBA-15 catalysts**

| Sample | Ni[a] (wt%) | Mo[a] (wt%) | Total content of (C + N)[b] (wt%) | C/N molar ratio[c] |
|---|---|---|---|---|
| Ni/CN@SBA-15 | 3.2 | – | 26.4 | 7.8 |
| $MoO_3$/CN@SBA-15 | – | 3.5 | 9.4 | 2.2 |
| Ni-1.5%$MoO_3$ /CN@SBA-15 | 3.1 | 0.6 | 22.3 | 6.9 |
| Ni-3.0%$MoO_3$ /CN@SBA-15 | 3.2 | 1.3 | 24.4 | 6.7 |
| Ni-4.5%$MoO_3$ /CN@SBA-15 | 3.2 | 2.2 | 32.3 | 6.5 |
| Ni-6.0%$MoO_3$ /CN@SBA-15 | 2.7 | 3.8 | 32.9 | 6.1 |
| Ni-7.5%$MoO_3$ /CN@SBA-15 | 2.7 | 4.7 | 33.5 | 6.6 |

[a] Determined by ICP-AES. [b] Determined by TG. [c] Determined by XPS.

## 1.2. Figures S1-S6

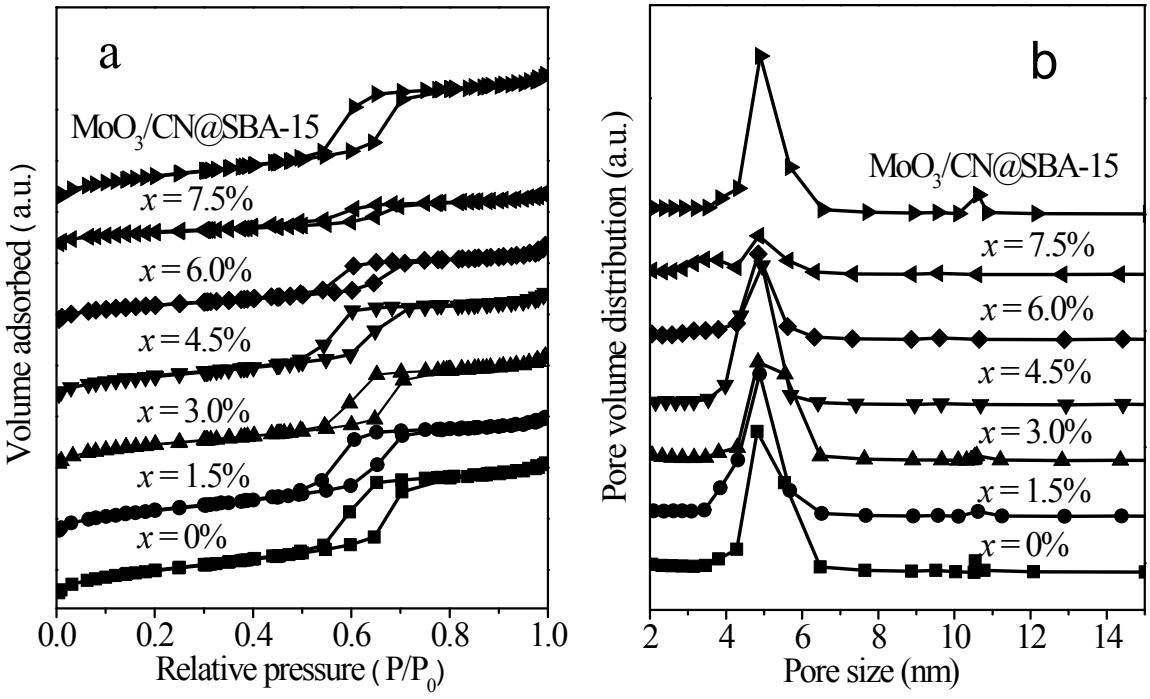



**Figure S1.** (a) $N_2$ sorption isotherms, and (b) BJH pore size distributions of the Ni-*x*$MoO_3$/CN@SBA-15 and $MoO_3$/CN@SBA-15 catalysts.

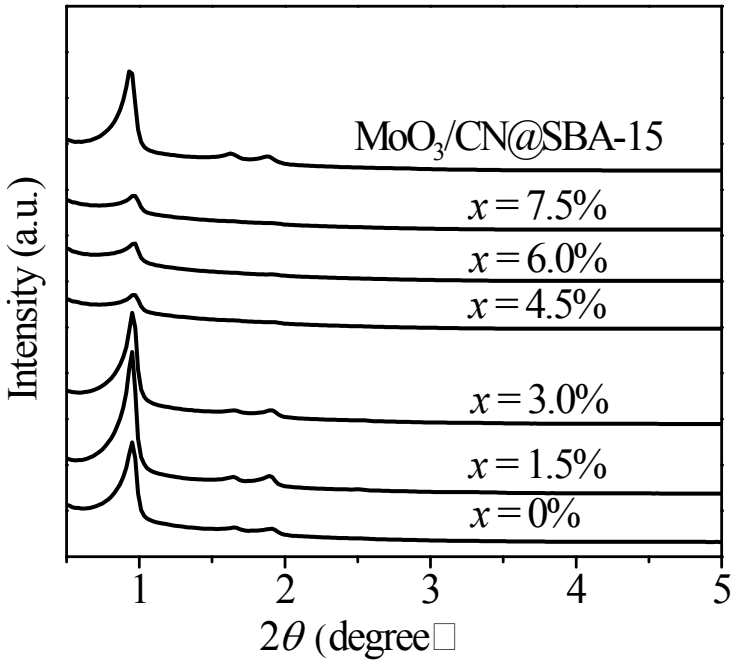



**Figure S2.** Low-angle XRD patterns of the Ni-$x$MoO$_3$/CN@SBA-15 and MoO$_3$/CN@SBA-15 catalysts.

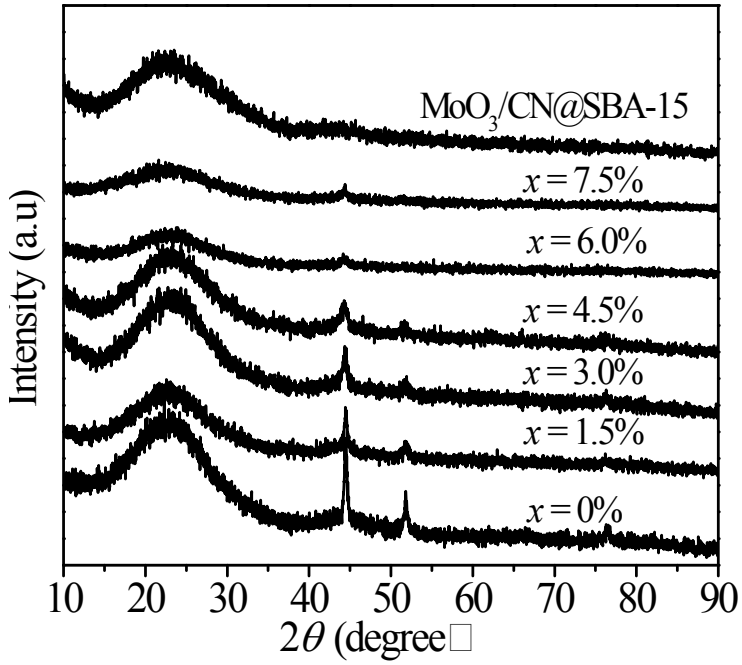



**Figure S3.** Wide-angle XRD patterns of the Ni-$x$MoO$_3$/CN@SBA-15 and MoO$_3$/CN@SBA-15 catalysts.

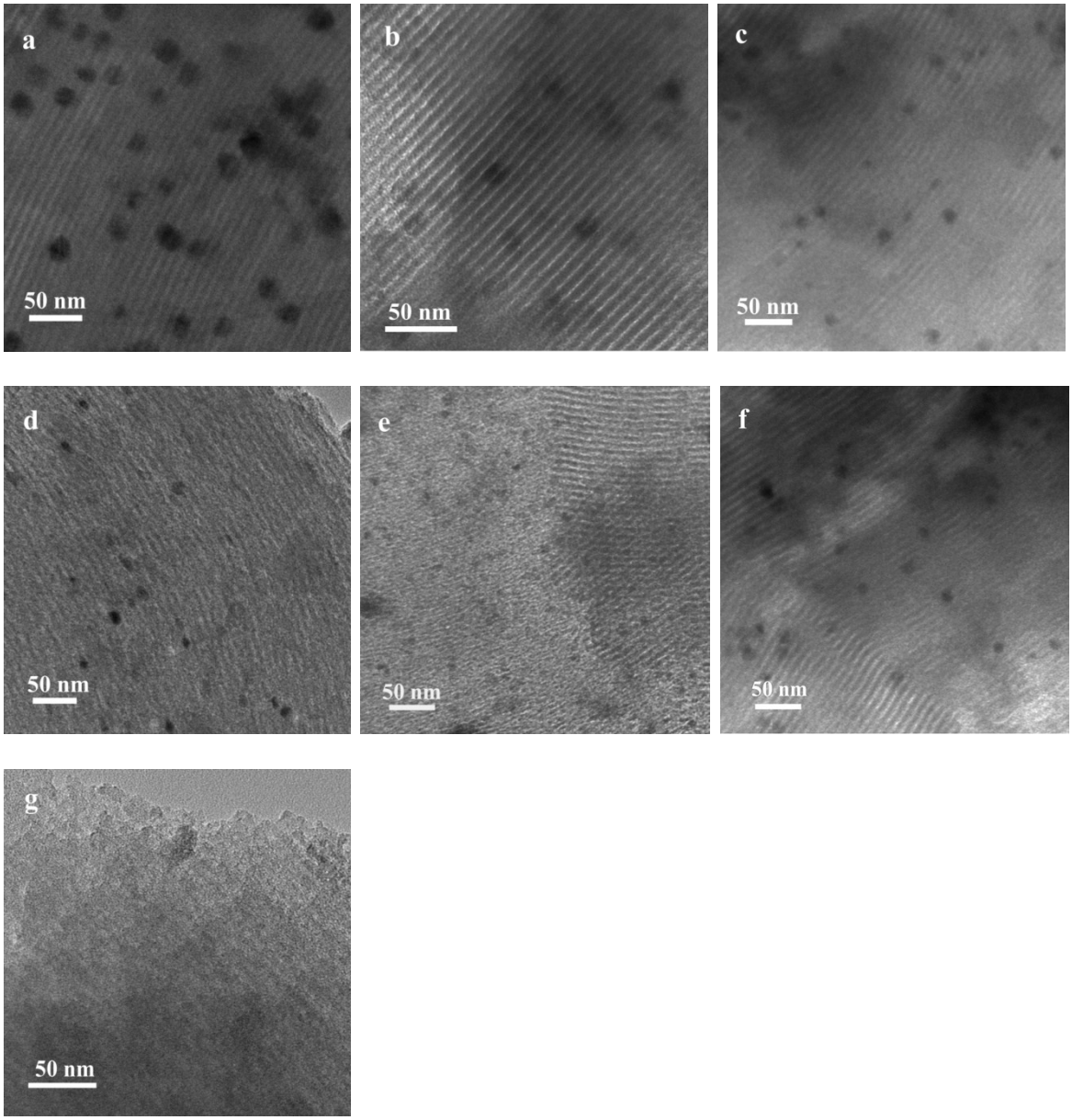



**Figure 4**. TEM images of the Ni-*x*$MoO_3$/CN@SBA-15 and $MoO_3$/CN@SBA-15 catalysts. (a) $x$ = 0%, (b) $x$ = 1.5%, (c) $x$ = 3.0%, (d) $x$ = 4.5%,. (e) $x$ = 6.0%, (f) $x$ = 7.5%, and (g) $MoO_3$/CN@SBA-15.

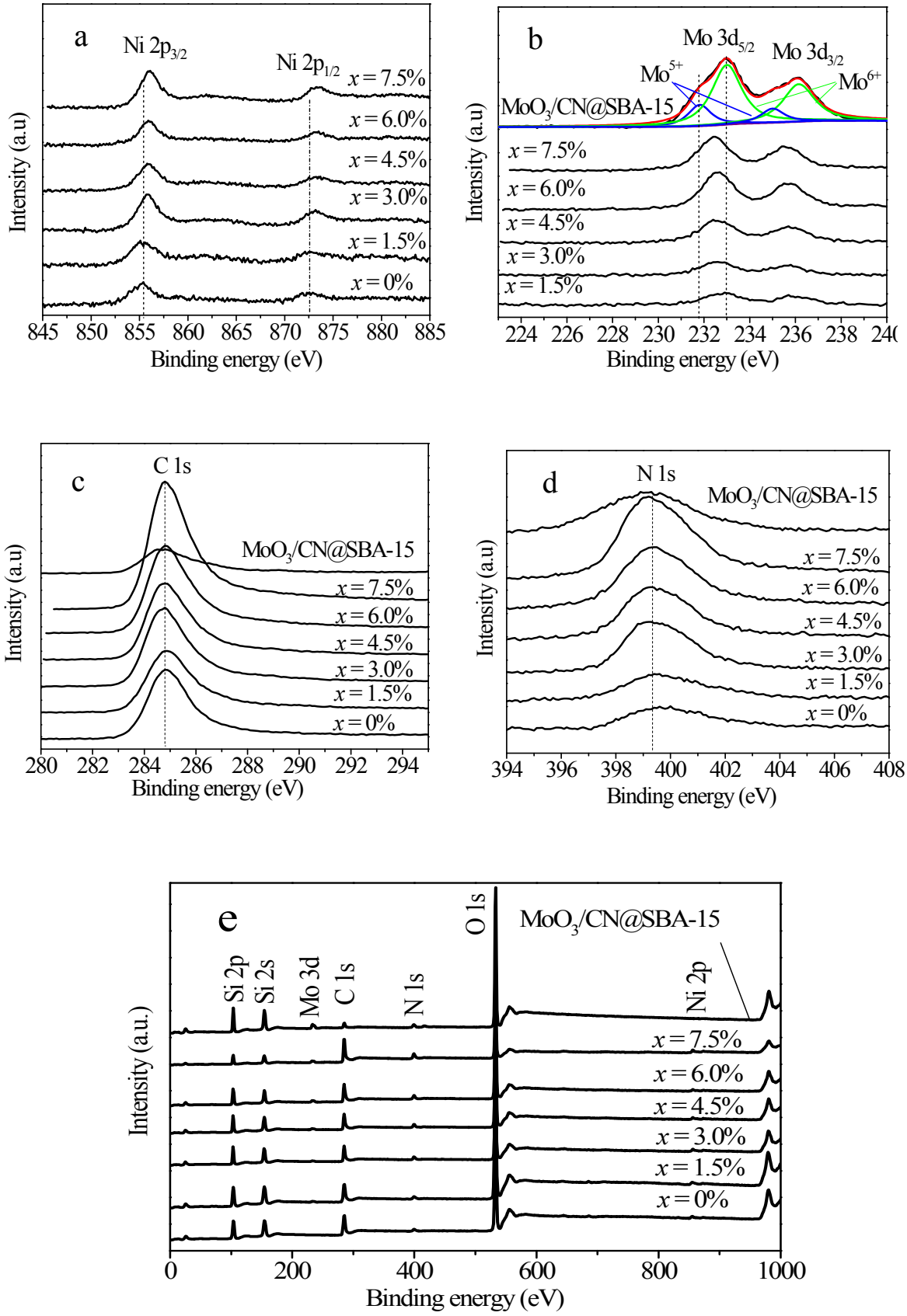
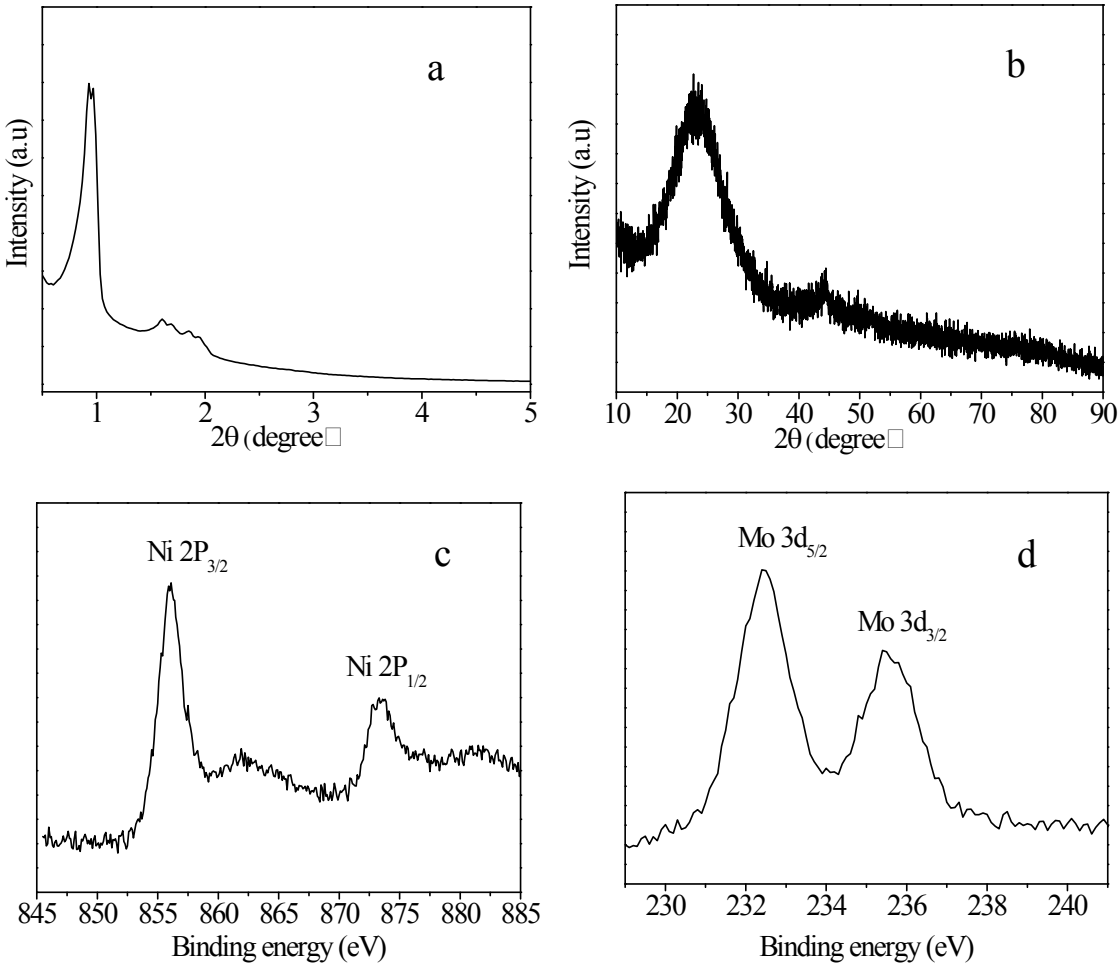



**Figure 5.** XPS spectra of the Ni-$x$MoO$_3$/CN@SBA-15 and MoO$_3$/CN@SBA-15 catalysts: (a) Ni 2p, (b) Mo 3d, (c) C 1s, (d) N 1s, and (e) the survey scan.



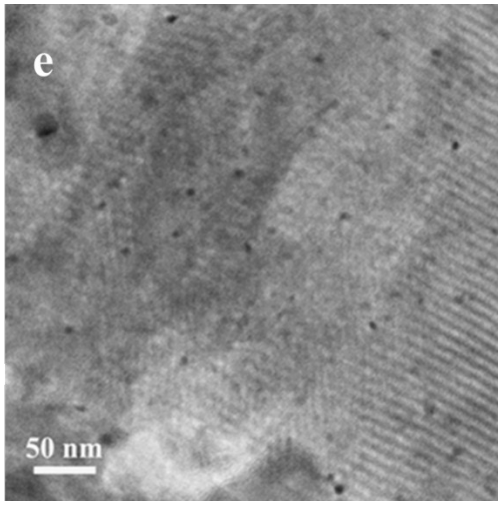




**Figure S6.** (a.b), XRD, (c,d), XPS and (e), TEM results of the spent Ni-6.0%$MoO_3$/CN@SBA-15 catalyst for the reduction of 2,4-dichloronitrobenzene after the tenth run.