

## Supporting Materials

### High-Efficient hydrogenation reduction of Nitrate to Ammonia and Nitrogen via Ni-MOF-74 Reduced-Derived Ni-Based Catalyst

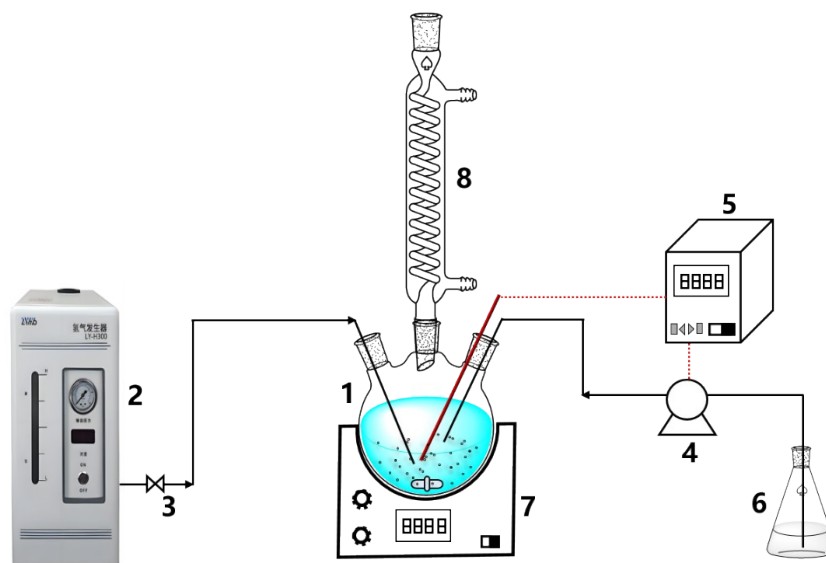
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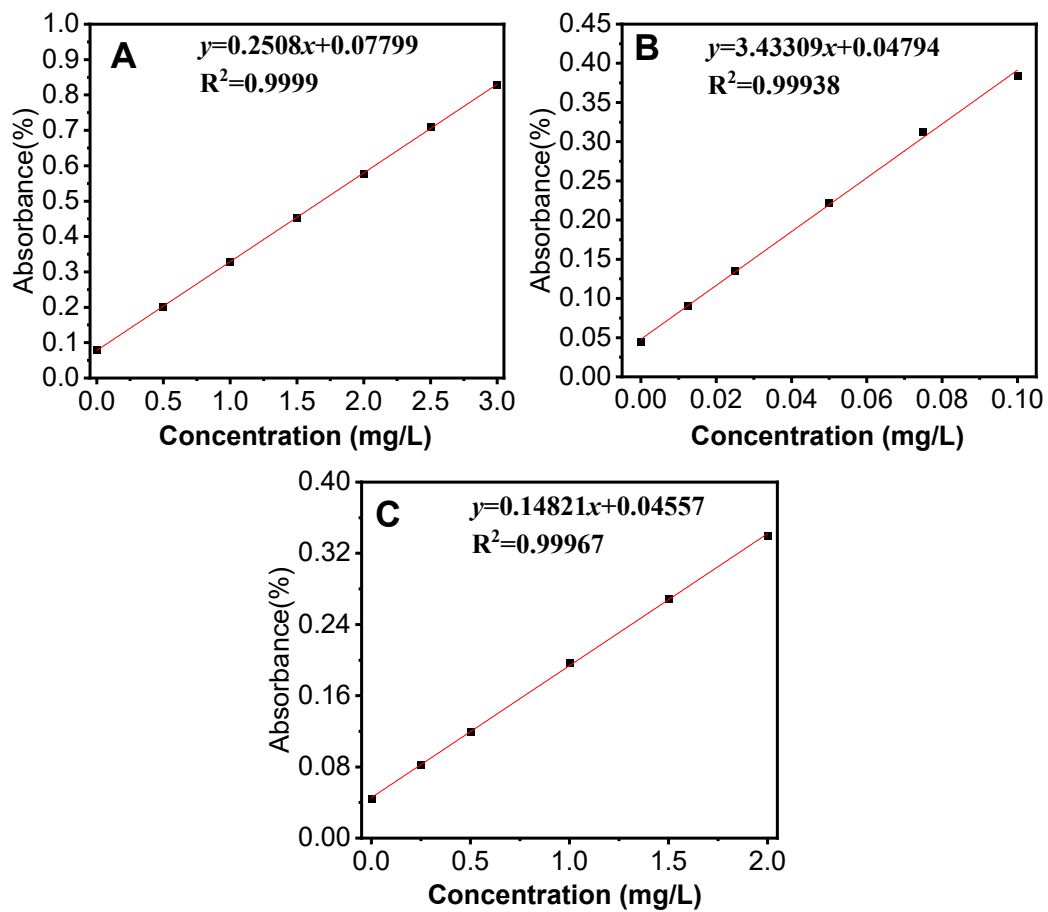
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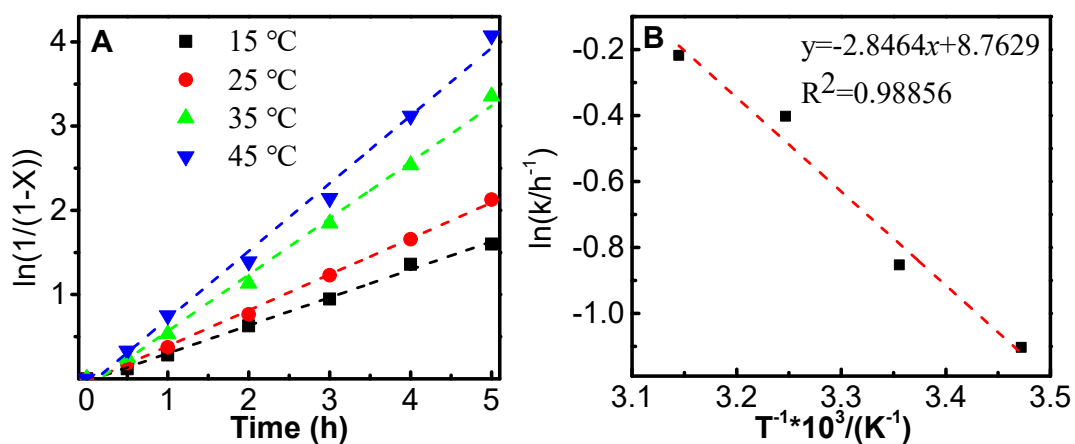


**Fig. 1S** the batch reaction apparatus of catalytic hydrogen reduction of nitrate

1. Reactor; 2. Hydrogen generator; 3. One-way valve; 4. Peristaltic pump; 5. pH meter; 6. Acid solution; 7. Temperature controller; 8. Condenser.



**Fig. 2S** The standard curve of  $\text{NO}_3^-$ -N (A),  $\text{NO}_2^-$ -N (B), and  $\text{NH}_4^+$ -N (C) concentration with absorbance value

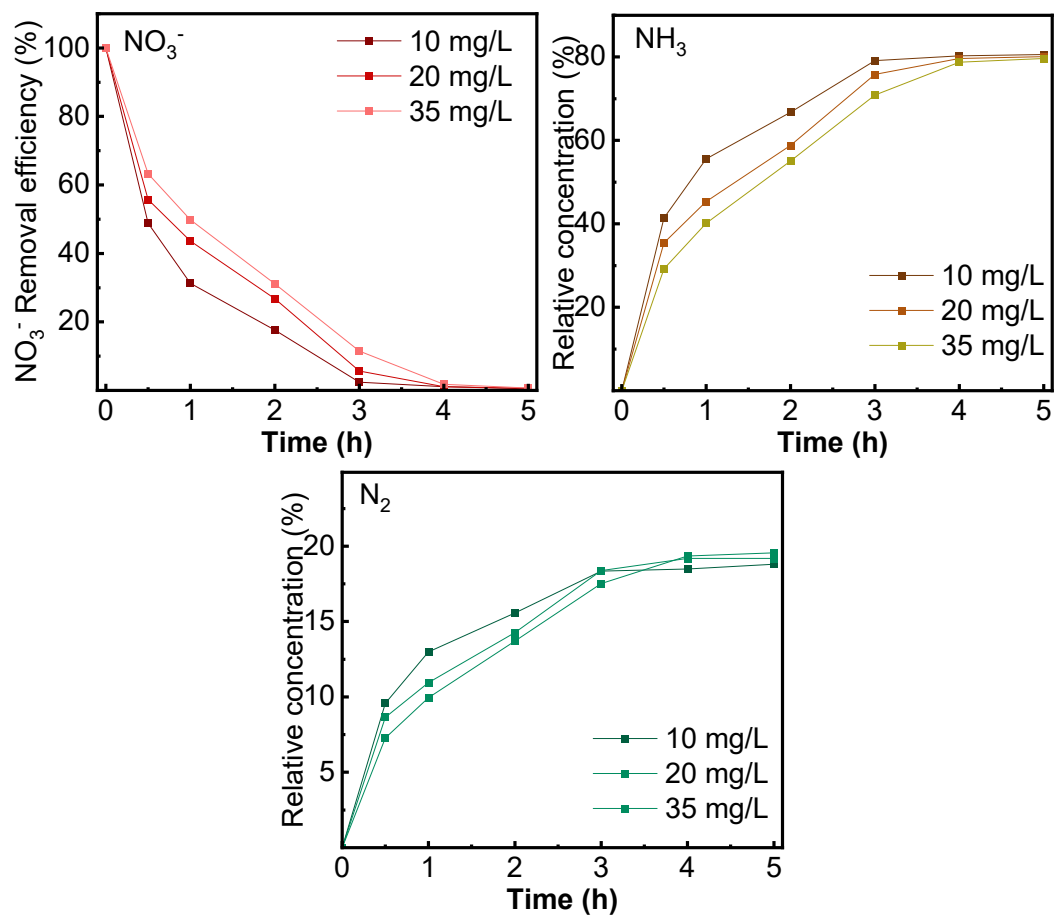


**Fig. 3S.** Kinetic fitting of first-order reaction at 15, 25, 35, 45 °C for  $\text{NO}_3^-$  degradation (A) and the linear fitting of  $1/T$  with  $\ln k$  (B)

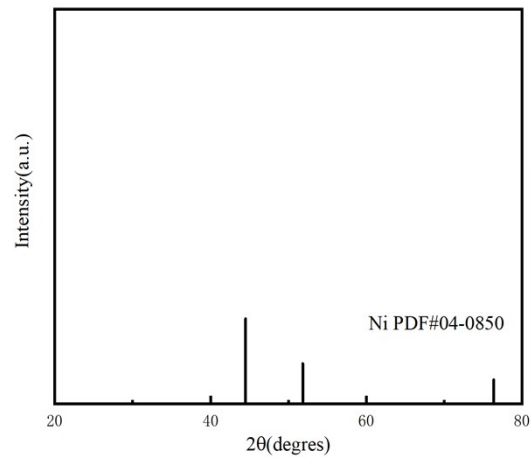
**Table 1S** Kinetic fitting data of  $\text{NO}_3^-$  degradation at different temperatures with MOF-47-400

Temperature/°C	Fitted linear equation	$k_{\text{obs}}/\text{h}^{-1}$	$R^2$
15	$y = 0.3319x - 0.030$	0.3319	0.9971
25	$y = 0.4260x - 0.0384$	0.4260	0.9985
35	$y = 0.6690x - 0.1024$	0.6690	0.9958
45	$y = 0.8041x - 0.0912$	0.8041	0.9943

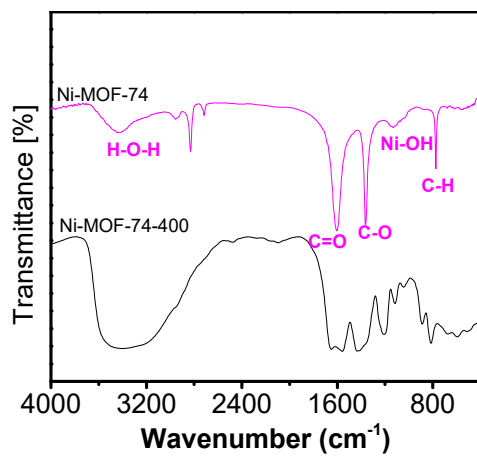
$k_{\text{obs}}$ : speed constant of first-order reaction for  $\text{NO}_3^-$  degradation



**Fig. 4S** The effect of Lower nitrate concentration of 10, 20 and 35 mg/L on the hydrogenation reduction performance of Ni-MOF-74-400 at 25 °C during time processing.



**Fig. 5S.** the standard PDF card of Ni



**Fig. 6S** the FT-IR spectra for the Ni-MOF-74 and its derived-catalyst