

Supplementary Information

High Hydrogen Release Catalytic Activity by Quasi-MOF Prepared via Post-Synthetic Pore Engineering

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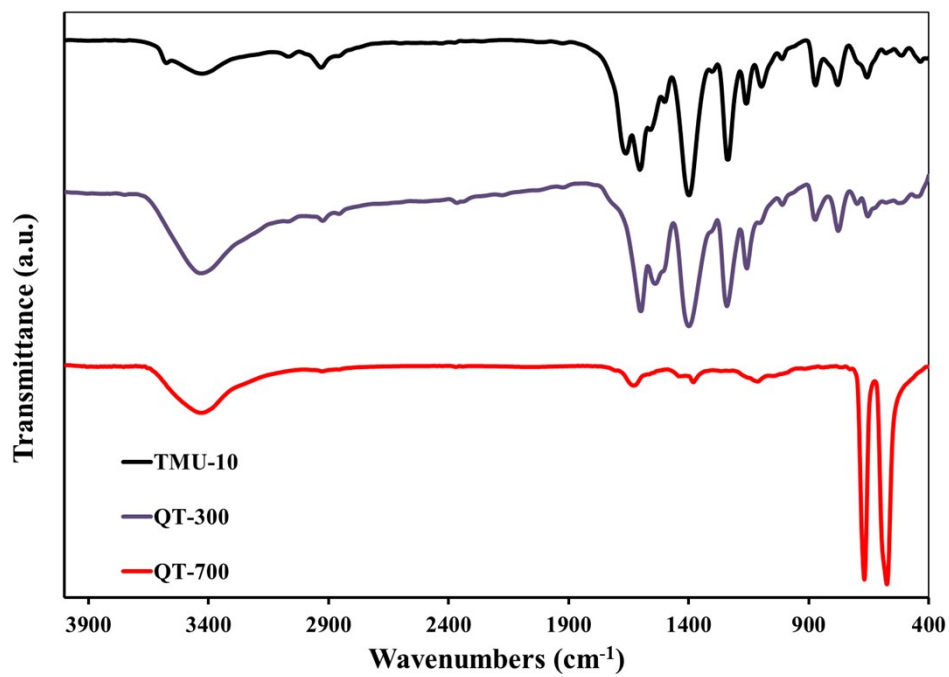


Figure S1. IR spectra of TMU-10 and QT-x samples.

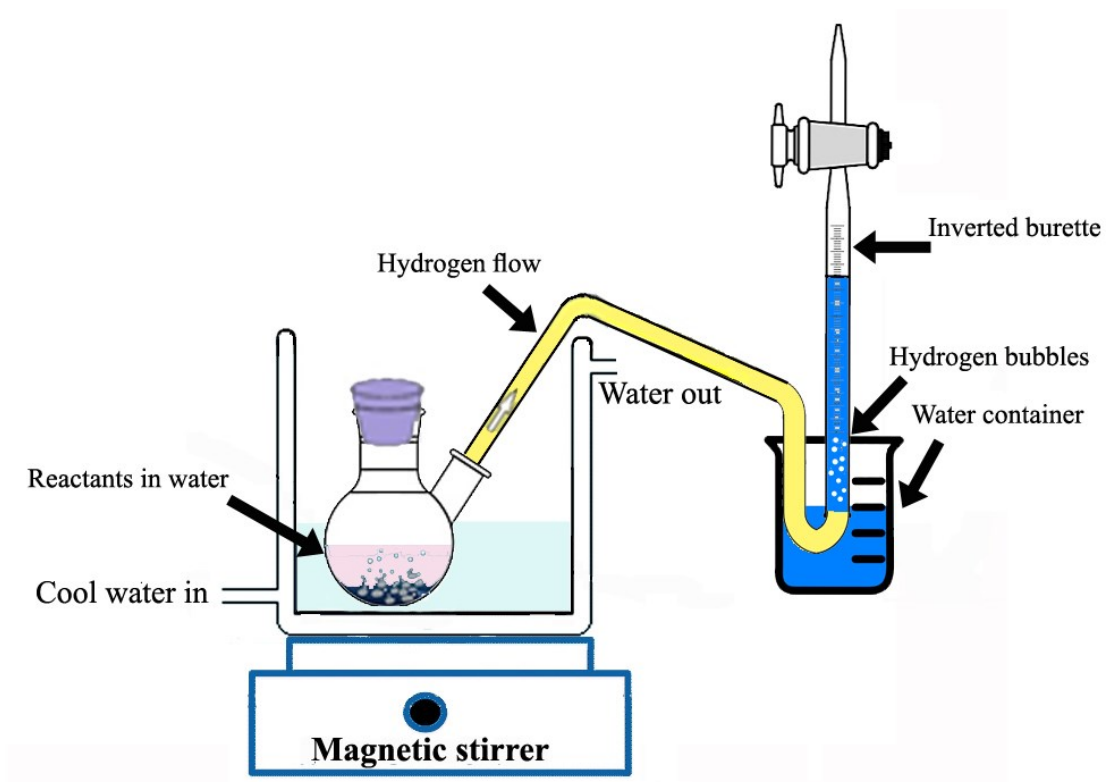


Figure S2. Schematic representation of hydrogen generation reaction setup.

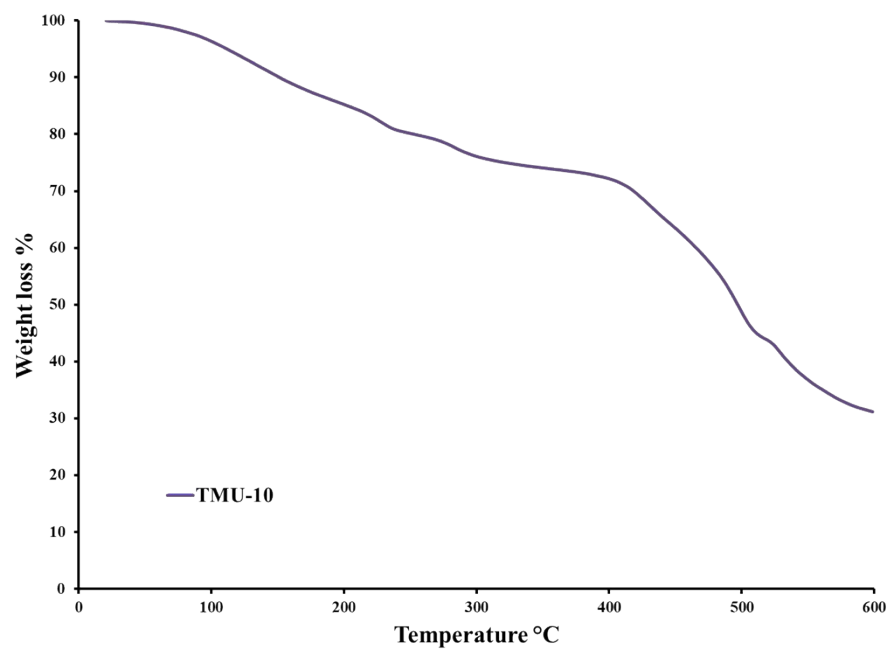


Figure S3. Thermogravimetric profiles of TMU-10.

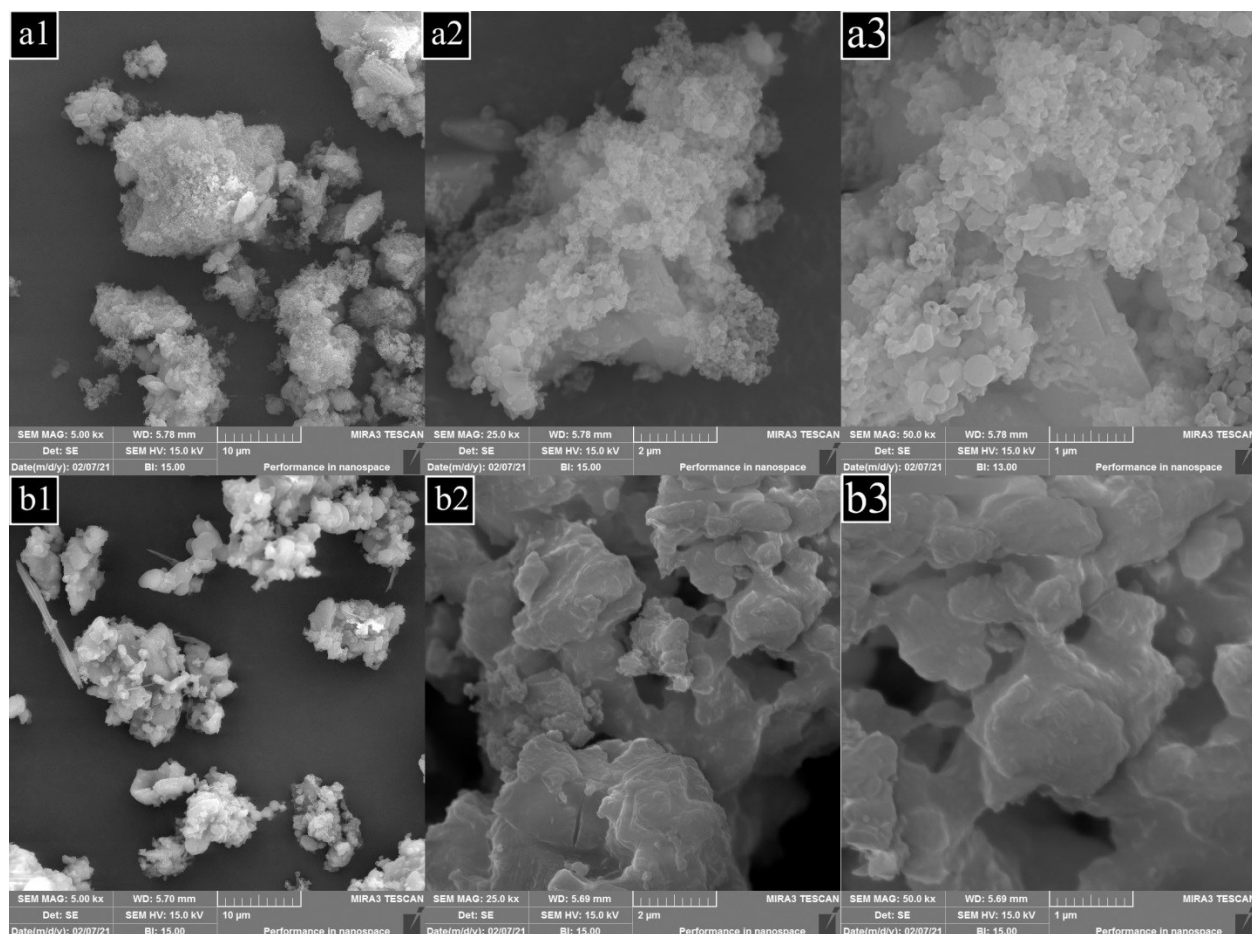


Figure S4. FE-SEM images of TMU-10 (a) and QT-300 (b) samples.

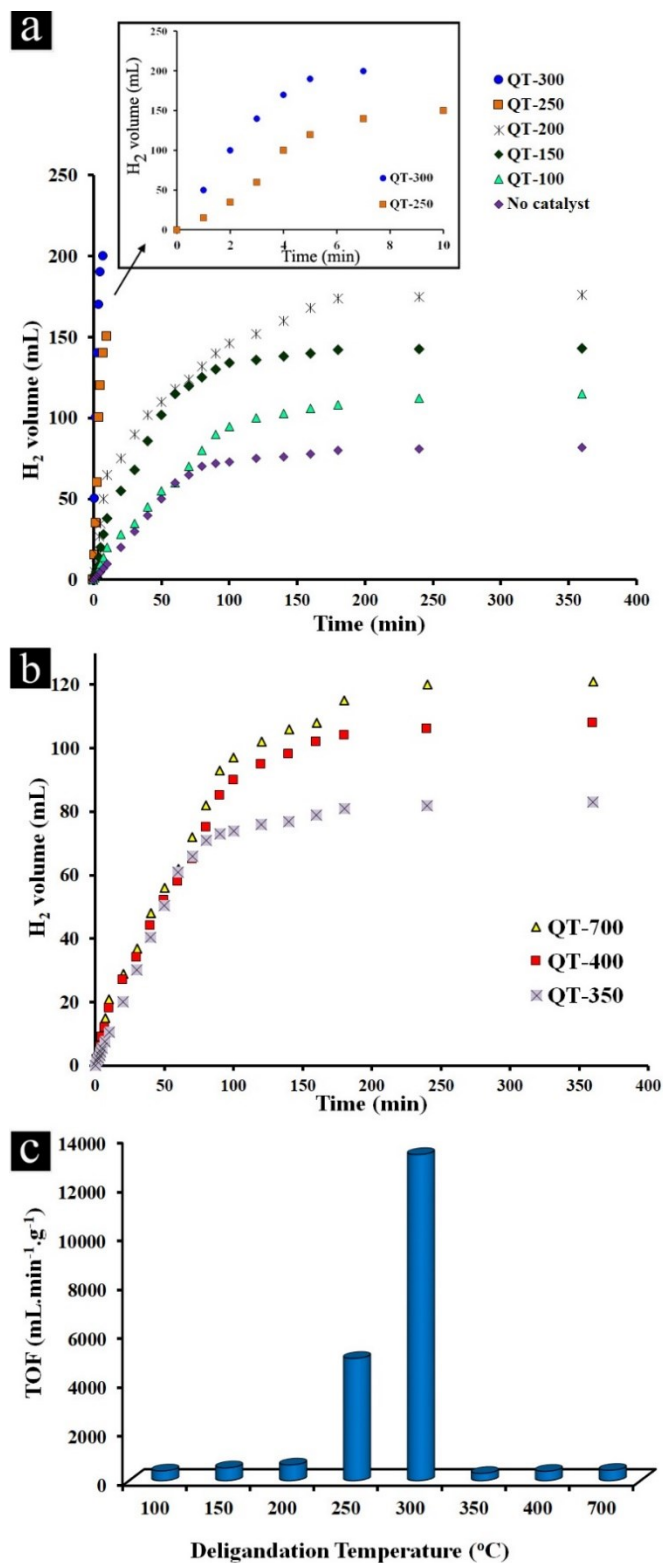


Figure S5. Time plots of the hydrolysis of NaBH₄ catalyzed by various QT-x samples at different deligandation temperatures (a, b). Comparison of TOF values related to various QT-x catalysts: experimental conditions [NaBH₄] = 125 mM, catalyst dosage = 1.5 mg T= RT.

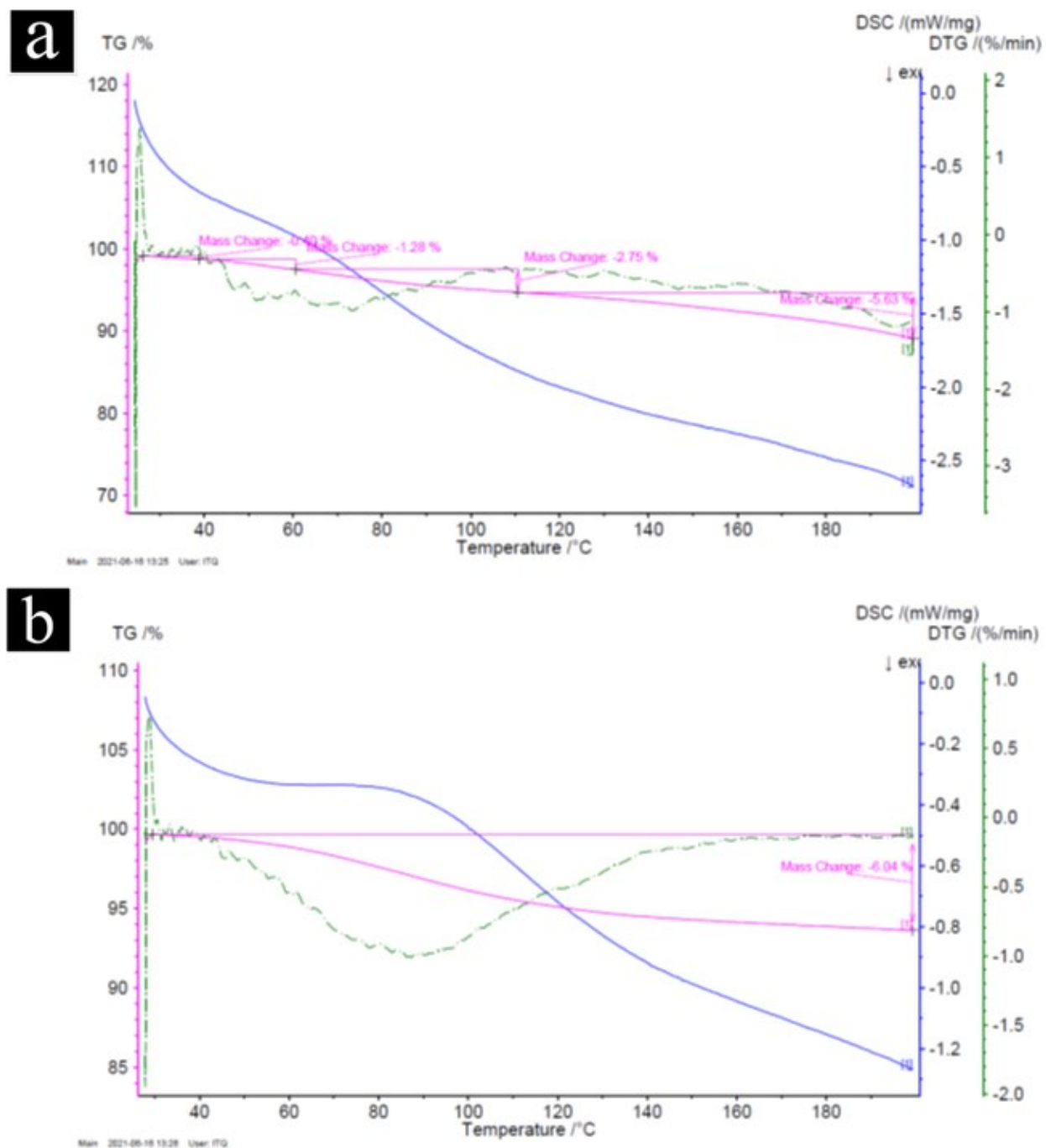


Fig. S6. Thermogravimetric analysis of ambient equilibrated (a) TMU-10 and (b) QT-300 showing their water content related to hydrophilicity.

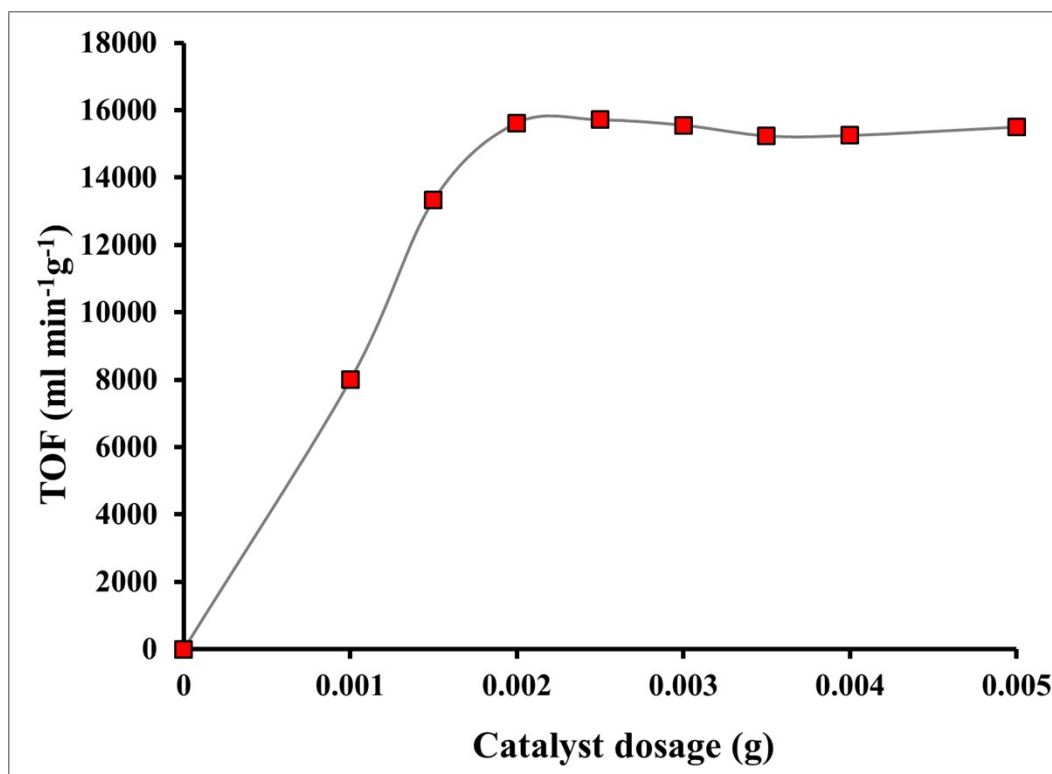


Figure S7. TOF values in presence of various amount of QT-300 catalyst.

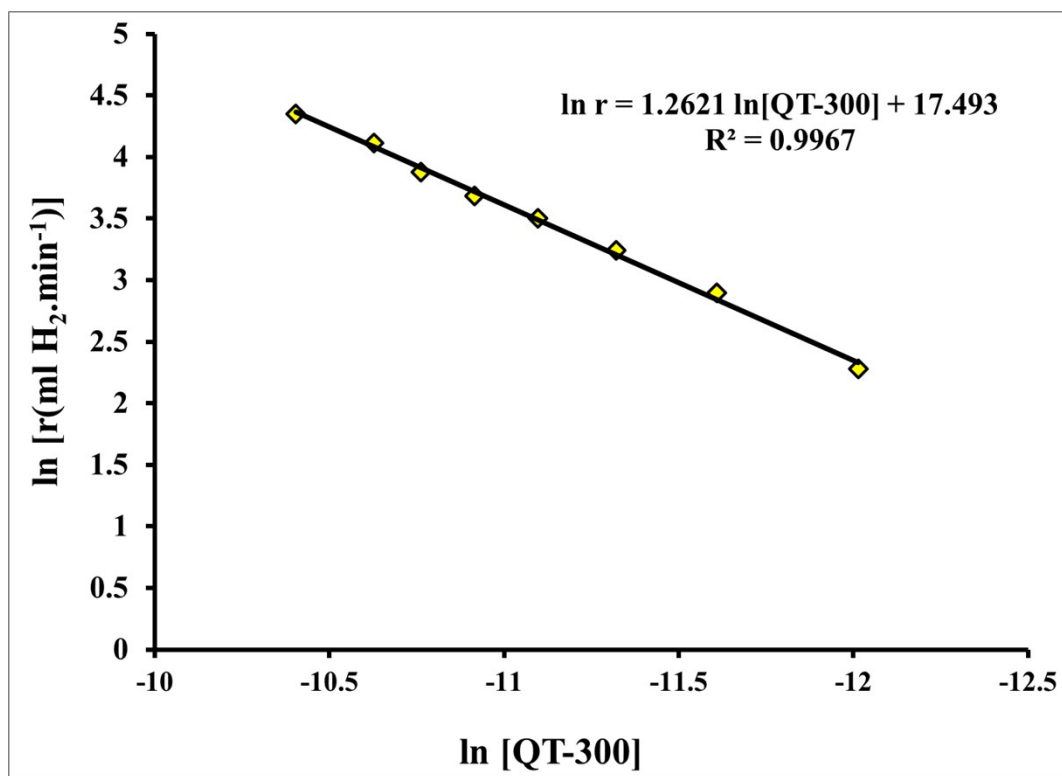


Figure S8. Plot of H₂ generation rate versus the concentration of QT-300 catalyst both in natural logarithmic scales.

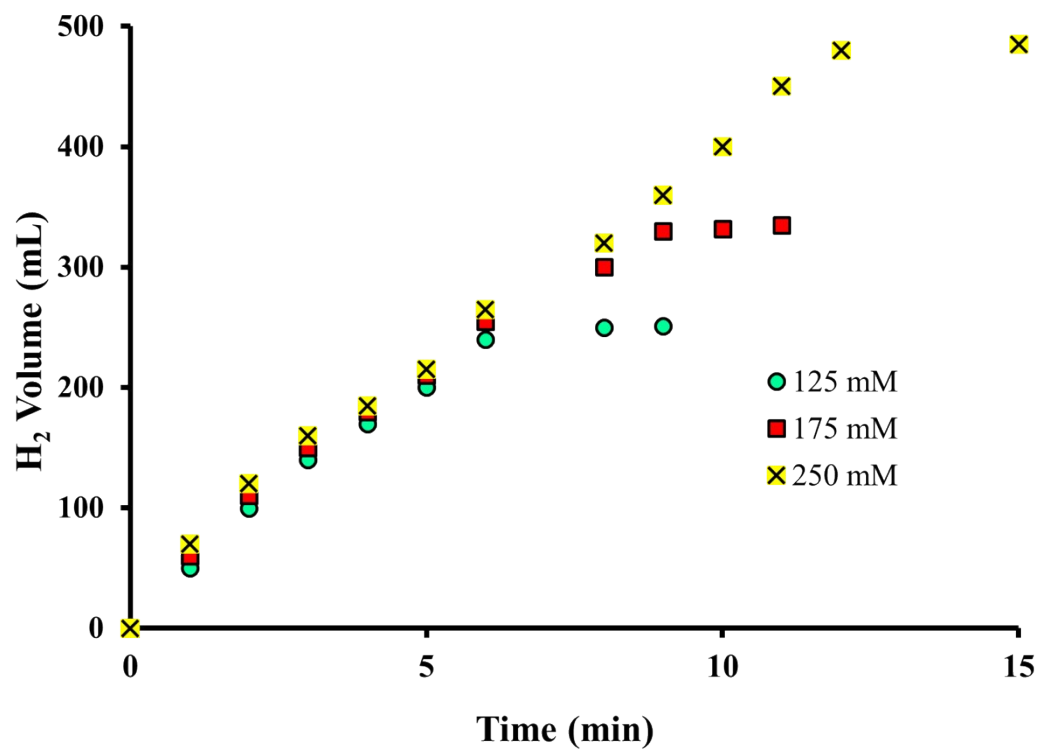


Figure S9. The effect of different concentrations of NaBH_4 on HGR over 2 mg of QT-300 at 25°C.

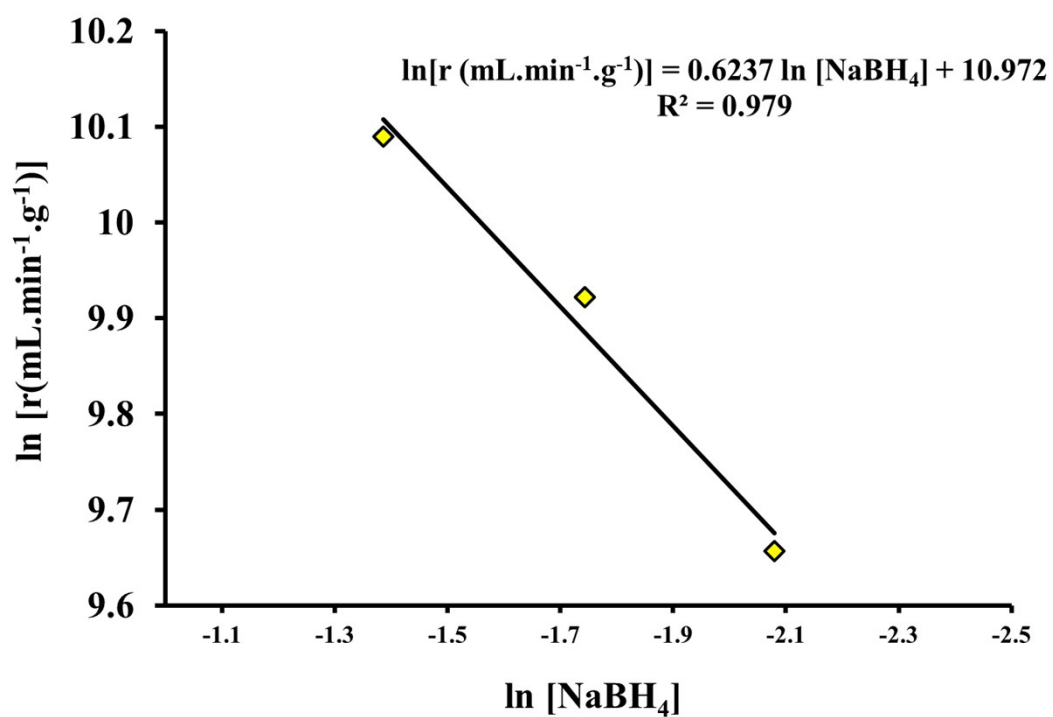


Figure S10. Plot of HGR versus the concentration of NaBH_4 (both in natural logarithmic scale) over QT-300 catalyst at 25 °C.

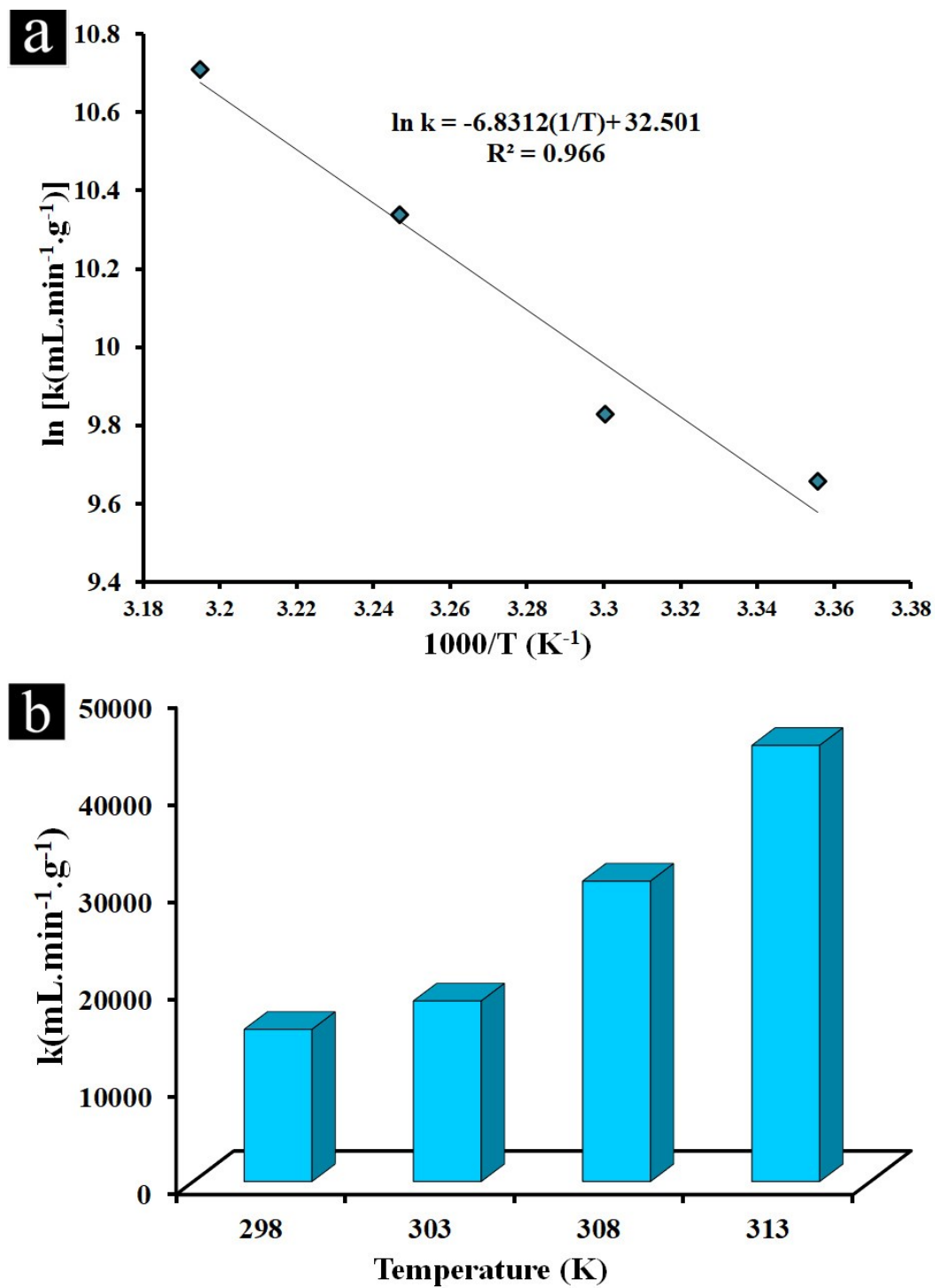


Figure S11. Temperature dependence of HGR over 2 mg of QT-300 catalyst, $[\text{NaBH}_4] = 125$ mM.

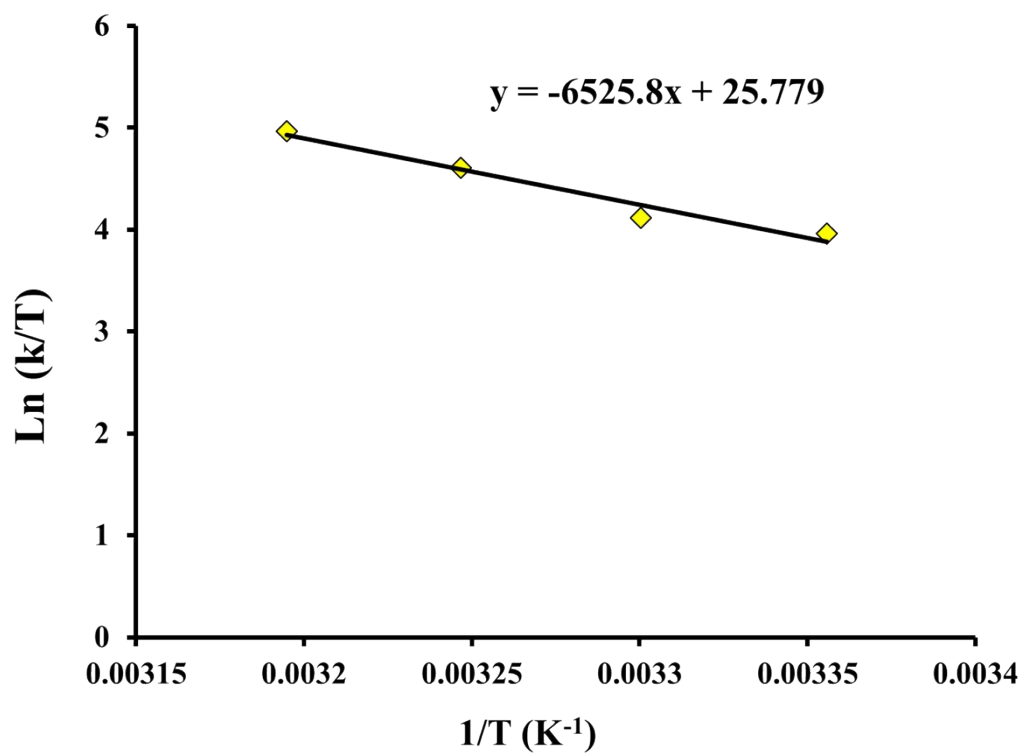


Figure S12 The Eyring plot for obtaining thermodynamic parameters on HGR over QT-300 catalyst.

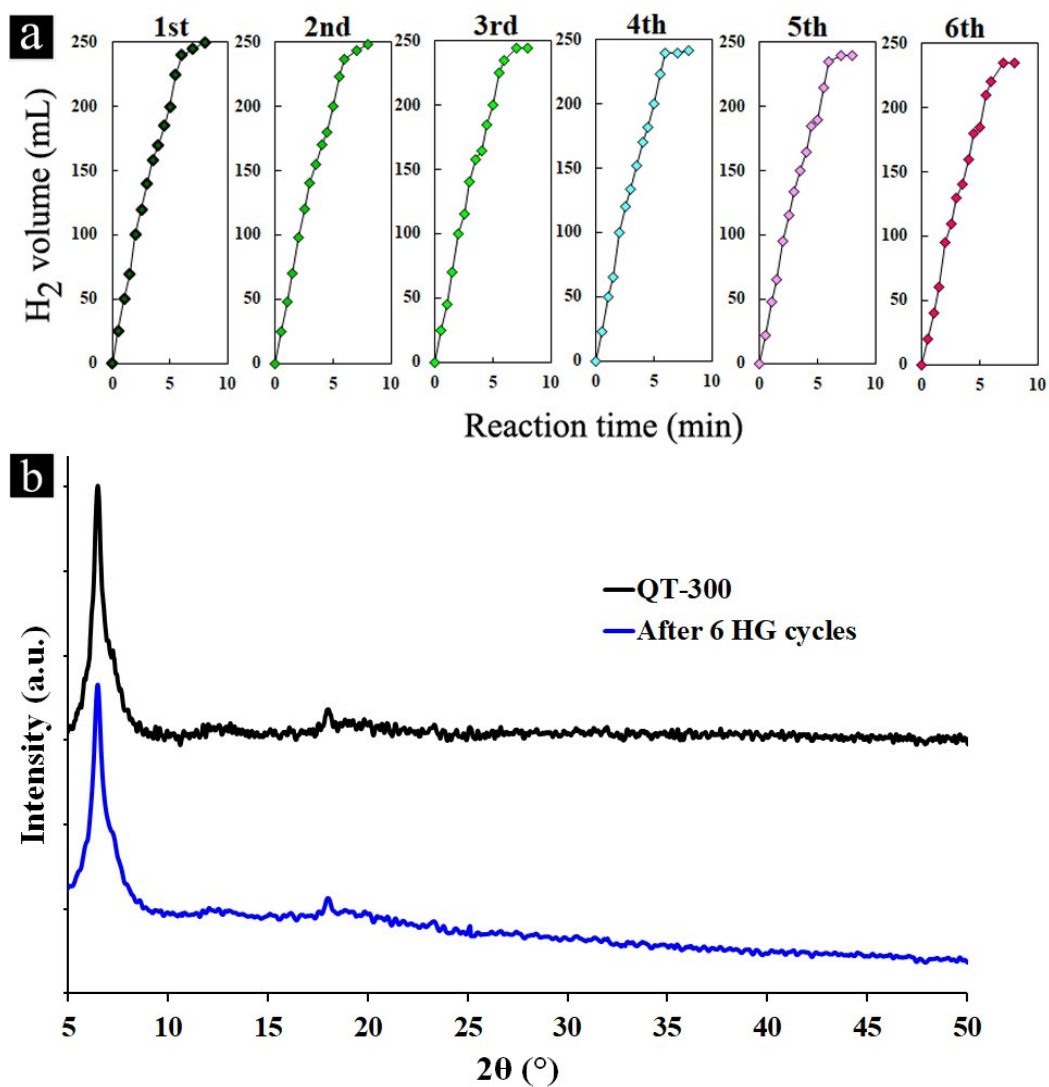


Figure S13 The reusability of the QT-300 catalyst on $NaBH_4$ hydrolysis at 25 $^\circ C$ for six catalytic cycles (a) and the XRD pattern of the QT-300 catalyst after six catalytic runs (b).

Table S1. BET surface area, total pore volume, micro- and mesopore volume of the synthesized MOFs.

| Sample | S_{BET} (m^2g^{-1}) | V_t (cm^3g^{-1}) | V_{micro} (cm^3g^{-1}) | V_{meso} (cm^3g^{-1}) |
|--------|--|--------------------------------------|---|--|
| TMU-10 | 8.2 | 0.023 | 0.004 | 0.023 |
| QT-300 | 38.8 | 0.157 | 0.015 | 0.142 |

Table S2. Effect of QT-300 amount as a catalyst on TOF of NaBH_4 hydrolysis.

| Entry | Catalyst dosage (mg) | TOF ($\text{ml min}^{-1}\text{g}^{-1}$) | Time (min) |
|-------|-------------------------|--|------------|
| 1 | 0 | *1 | 60 |
| 2 | 1 | 8000 | 15 |
| 3 | 1.5 | 13333.3 | 10 |
| 4 | 2 | 15625 | 8 |
| 5 | 3 | 15555 | 6 |
| 6 | 3.5 | 15238 | 6 |
| 7 | 4 | 15250 | 5 |
| 7 | 5 | 15500 | 4 |

Experimental conditions: $[\text{NaBH}_4] = 125 \text{ mM}$, $T = 25 \text{ }^\circ\text{C}$. *HGR in $\text{mLH}_2\cdot\text{min}^{-1}$.