Unveiling the promoting effect of water on formaldehyde oxidation over Pt/TiO_2: insights from H/D kinetic isotope effect, *in situ* FTIR, and DFT

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Table S1. Detailed technical parameters during KIE experiment.

Formaldehyde	F1 flow (mL min^{-1})	Water	F2/F3 flow (mL min^{-1})	RH (%)	Water bath temperature (°C)
HCHO	40	-	F2=0	0	-
HCHO	40	H_2O	F3=30	10	4
HCHO	40	H_2O	F3=30	20	10
HCHO	40	H_2O	F3=30	40	35
HCHO	40	H_2O	F3=30	50	40
1.5 mL DCDO (20 wt % in D_2O)	40	H_2O	F3=30	40	35
HCHO	40	D_2O	F3=30	40	35
1.5 mL DCDO (20 wt % in D_2O)	40	D_2O	F3=30	40	35

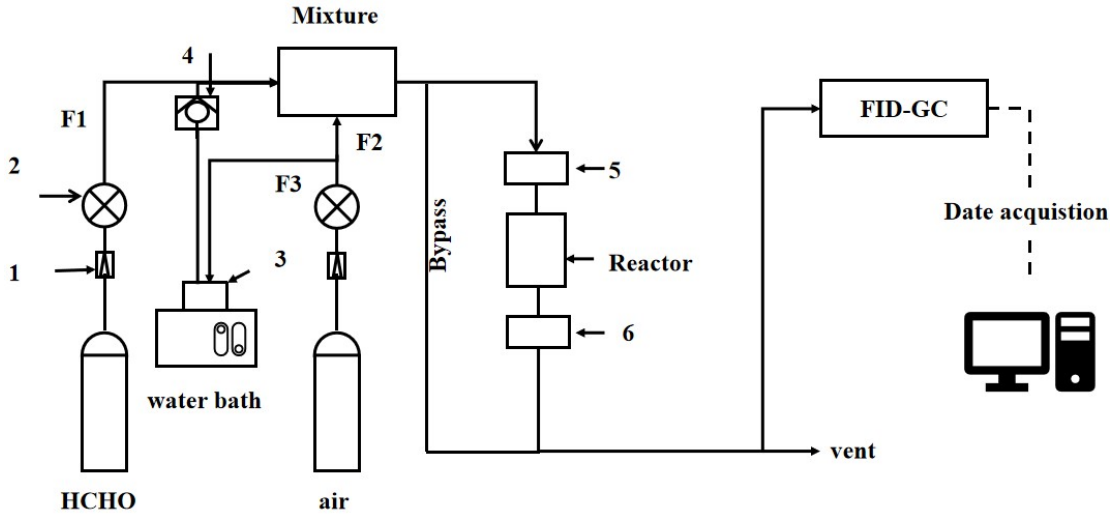

Fig. S1. Schematic diagram of the experimental setup: (1) Pressure gauge; (2) Mass flow controller; (3) Evaporation tank with water; (4) Check valve; (5) Relative humidity probe (in); (6) Relative humidity probe (out).

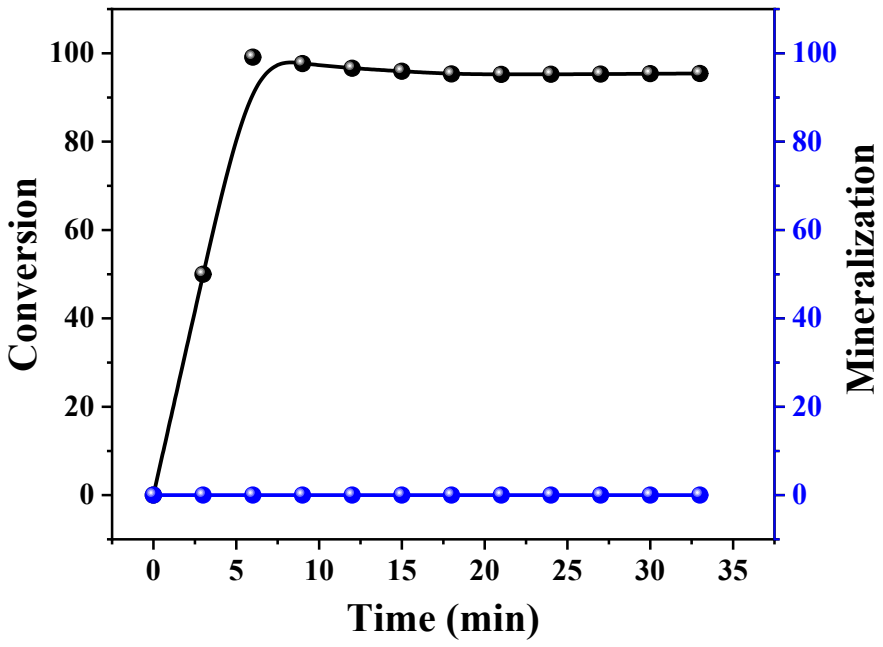

Fig. S2. HCHO conversion and mineralization over calcined Pt/TiO_2 GF catalyst under dry air.

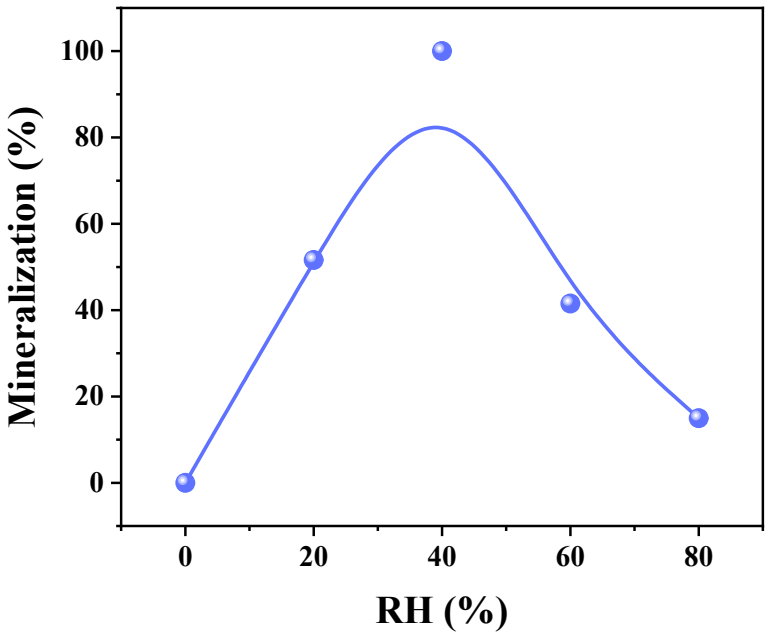

Fig. S3. Effect of relative humidity on HCHO mineralization over Pt/TiO_2 glass fiber.

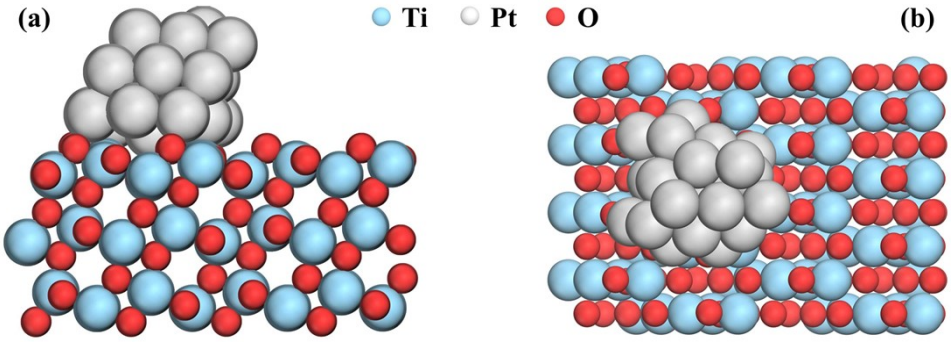

Fig. S4. Side view (a) and top view (b) of Pt/TiO_2 Structure.

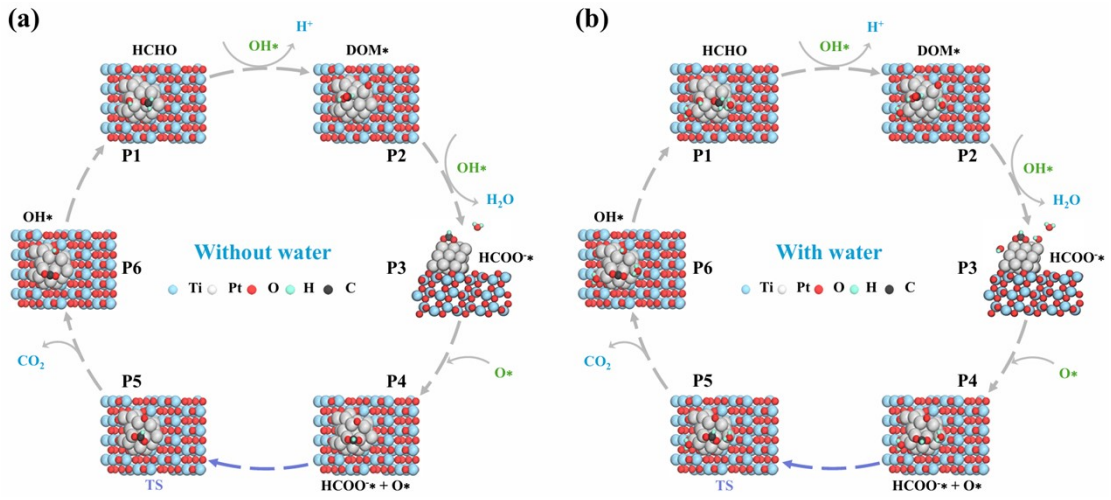

Fig. S5. Theoretical simulation of reaction pathway, transition states (TS), and intermediate states for HCHO oxidation on Pt/TiO_2: (a) dry air conditions, (b) humid air conditions.