Supporting Information

Supplementary Figures:

Experimental section:

Calculation methods for Q_{st}, Q_0, A_0, K_H values:

The isosteric enthalpies (Qst) of CO_2 in PHCTFs were calculated from the adsorption isotherms measured at differernt temperatures in term of Clausius-Clapeyron equation:

$$\ln P = \frac{Q_{st}}{RT} + C \quad (1)$$

where R, C, P and T are the gas constant, equation constant, the pressure and temperature at the equilibrium state, respectively. The first virial coefficients (A_0) are obtained from the slopes of the virial plots. From their intercepts, A_0 values relating to gas-material interaction were calculated. Henry's law constants (K_H) are calculated from the equation $K_H = \exp(A_0)$. Then, the limiting enthalpy of adsorption at zero surface CO_2 coverage (Q_0) can be obtained in term of Vant Hoff equation:

$$\frac{d\,[\ln K_H]}{dT} = \frac{Q_0}{RT^2} \quad (2)$$

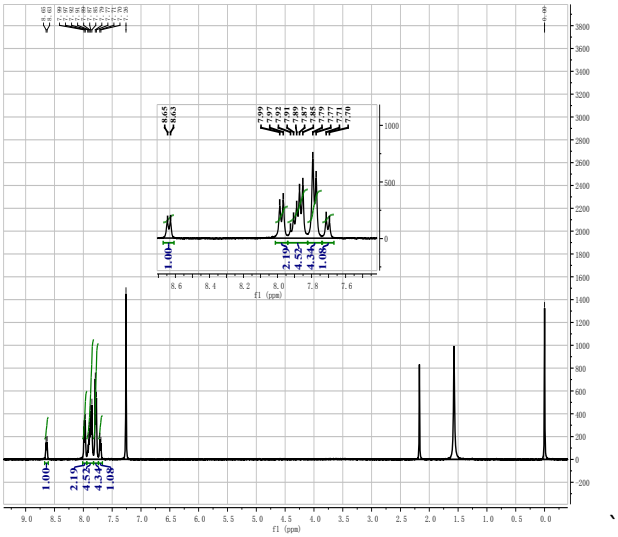

Figure S1. ^{1}H-NMR spectrum of PHPZ-DN.

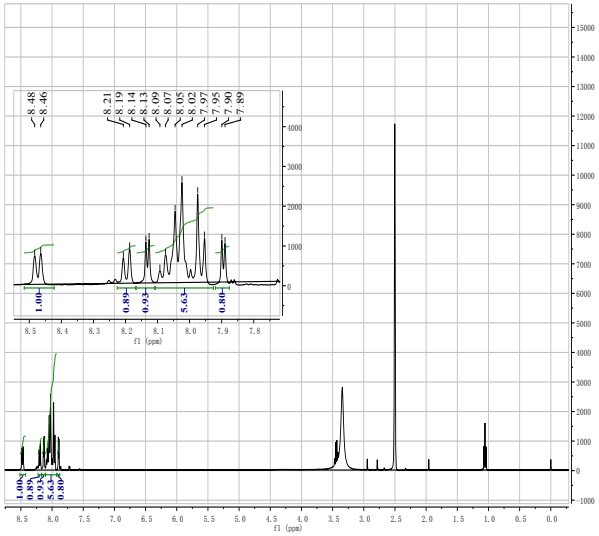

Figure S2. ^{1}H-NMR spectrum of THPZ-DN.

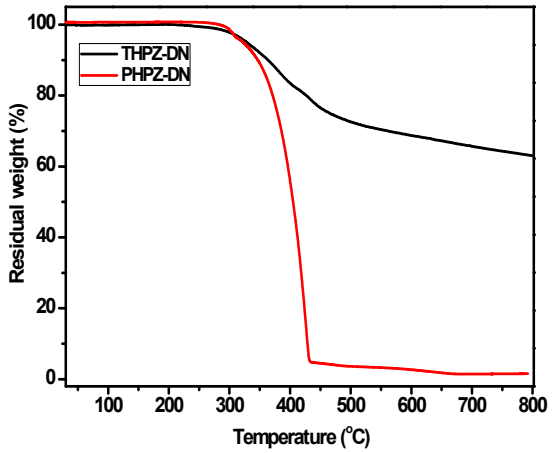

Figure S3. TGA thermograms of PHPZ-DN and THPZ-DN under nitrogen atmosphere.

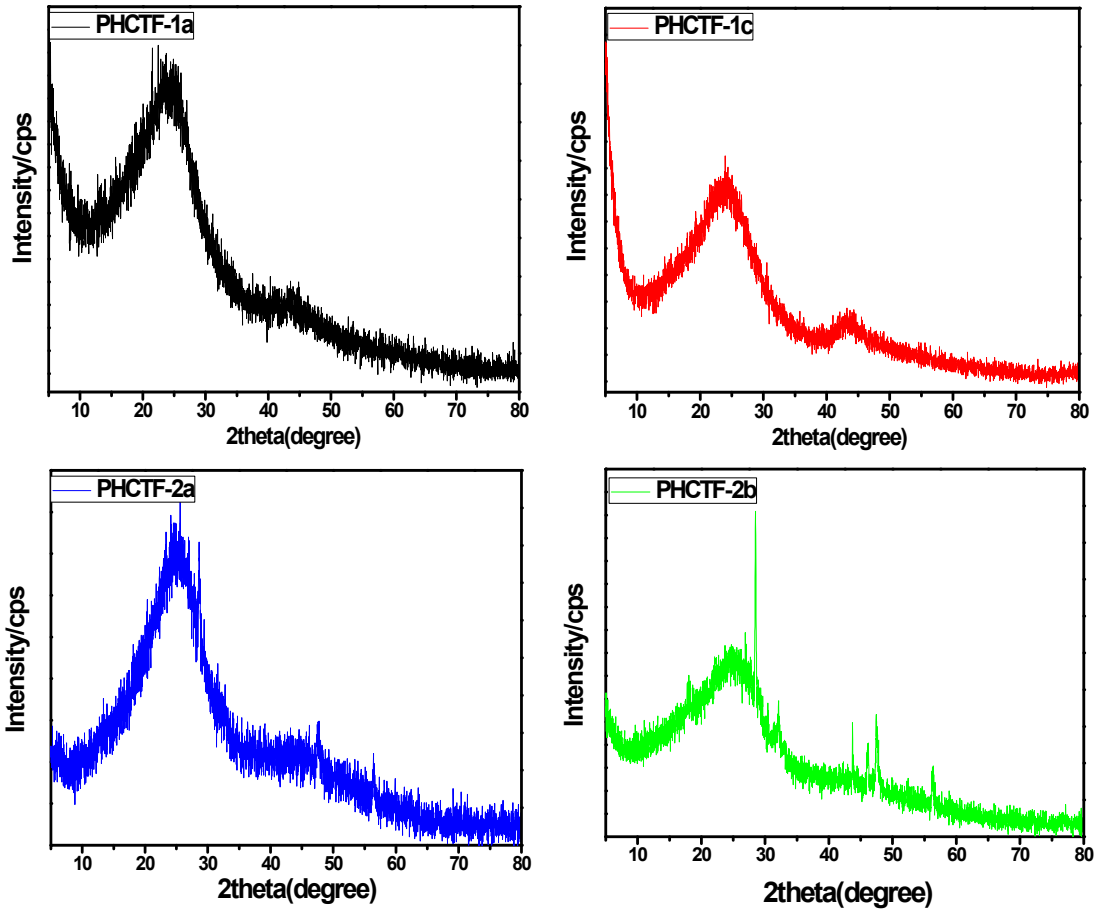

Figure S4. PXRD patterns of PHCTF-1a, PHCTF-1c, PHCTF-2a and PHCTF-2b.

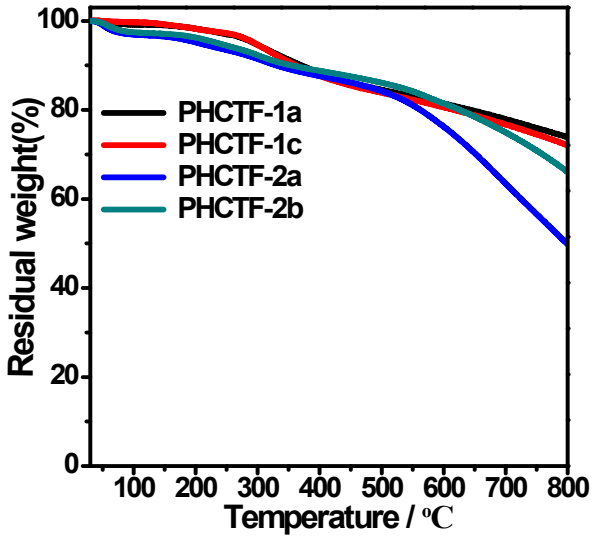

Figure S5. TGA curves of PHCTF-1a, PHCTF-1c, PHCTF-2a and PHCTF-2b in nitrogen atmosphere.

Table S1. Elemental analysis data of PHCTFs.

	Calculated(%)						Found(%)					
	C	H	N	S	C/N	C/H	C	H	N	S	C/N	C/H
PHCTF-1a	75.9	3.5	16.1	--	4.7	21.9	74.6	3.2	7.8	--	9.5	23.2
PHCTF-1b	75.9	3.5	16.1	--	4.7	21.9	74.3	3.0	7.4	--	10.0	24.8
PHCTF-1c	75.9	3.5	16.1	--	4.7	21.9	76.9	2.8	5.6	--	13.7	27.5
PHCTF-2a	67.8	2.8	15.8	9.1	4.3	24.2	56.9	2.5	13.8	3.0	4.1	22.8
PHCTF-2b	67.8	2.8	15.8	9.1	4.3	24.2	56.1	2.3	13.3	3.1	4.2	24.4

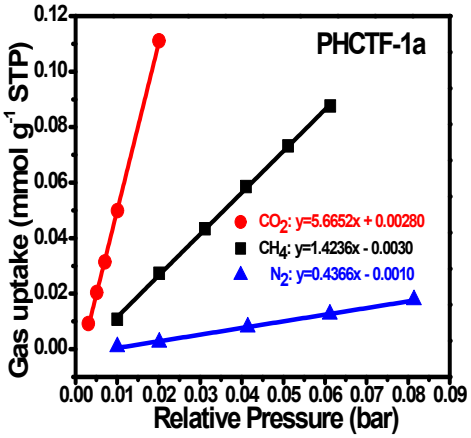

Figure S6. Adsorption selectivity of CO_2 over CH_4 and N_2 for PHCTF-1a calculated from Henry's law initial slope method at 273 K.

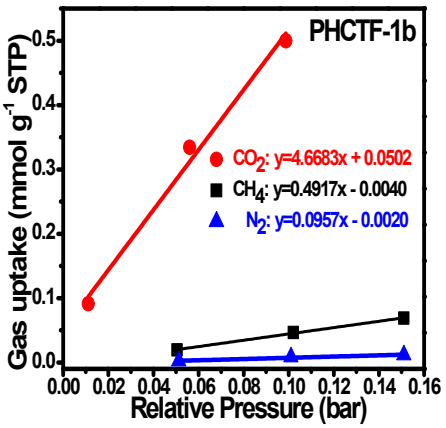

Figure S7. Adsorption selectivity of CO_2 over CH_4 and N_2 for PHCTF-1b calculated from Henry's law initial slope method at 273 K.

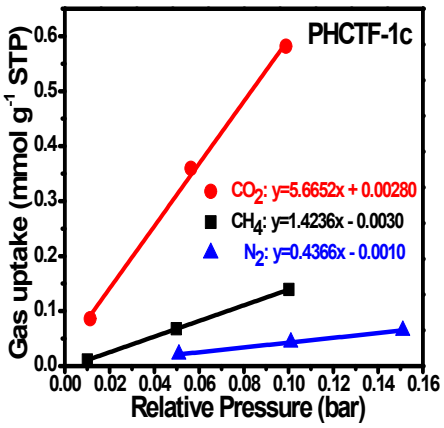

Figure S8. Adsorption selectivity of CO_2 over CH_4 and N_2 for PHCTF-1c calculated from Henry's law initial slope method at 273 K.

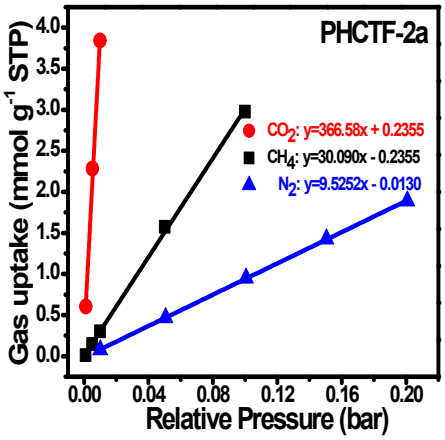

Figure S9. Adsorption selectivity of CO_2 over CH_4 and N_2 for PHCTF-2a calculated from Henry's law initial slope method at 273 K.

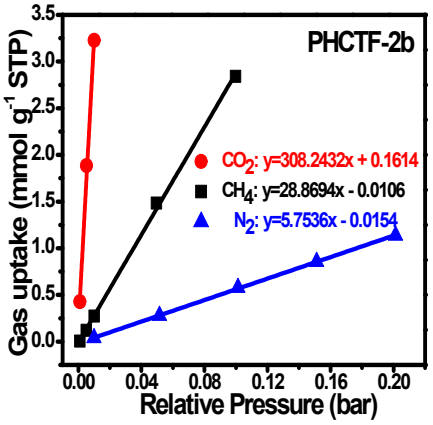

Figure S10. Adsorption selectivity of CO_2 over CH_4 and N_2 for PHCTF-2b calculated from Henry's law initial slope method at 273 K.