Supporting Information for

Influence of intermolecular interactions and crystal structure on desolvation mechanisms of solvates

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Table S1. Properties of the Solvents used.

solvent	Chemical structures	α	β	π*	Results
Acetonitrile		0.07	0.32	0.75	S1
Acetone		0.04	0.49	0.71	S2
n-propanol		0.37	0.48	0.52	S3
isopropanol		0.33	0.56	0.48	S4

Table S2. 2-theta of characteristic peaks of various crystal forms

Crystal Forms	2θ of characteristic peaks
Solvate S1	6.2, 7.0, 8.0, 10.7, 11.8, 12.6, 14.1, 18.5, 19.0, 21.3, 21.7, 22.2±0.2°
Solvate S2	7.0, 8.1, 8.9, 10.4, 12.0, 14.1, 19.3, 21.4, 21.6, 22.0, 23.6±0.2°
Solvate S3	7.4, 8.3, 9.1, 10.6, 12.9, 14.5, 14.7, 15.1, 16.9, 21.7, 22.2, 22.5±0.2°
Solvate S4	6.5, 8.2, 11.4, 12.1, 13.5, 13.7, 21.8, 22.6, 27.0±0.2°
Solvate Ⅲ	6.9, 7.7, 10.8, 13.6, 14.1, 16.9, 19.8, 20.5, 22.9, 23.9±0.2°
Form Ⅰ	7.6, 8.1, 10.5, 14.8, 17.3, 18.4, 18.6, 20.7, 23.3, 23.5±0.2°
Form Ⅱ	7.4, 7.9, 12.0, 12.7, 16.9, 17.3, 19.9, 20.9, 21.4, 22.6, 23.3±0.2°

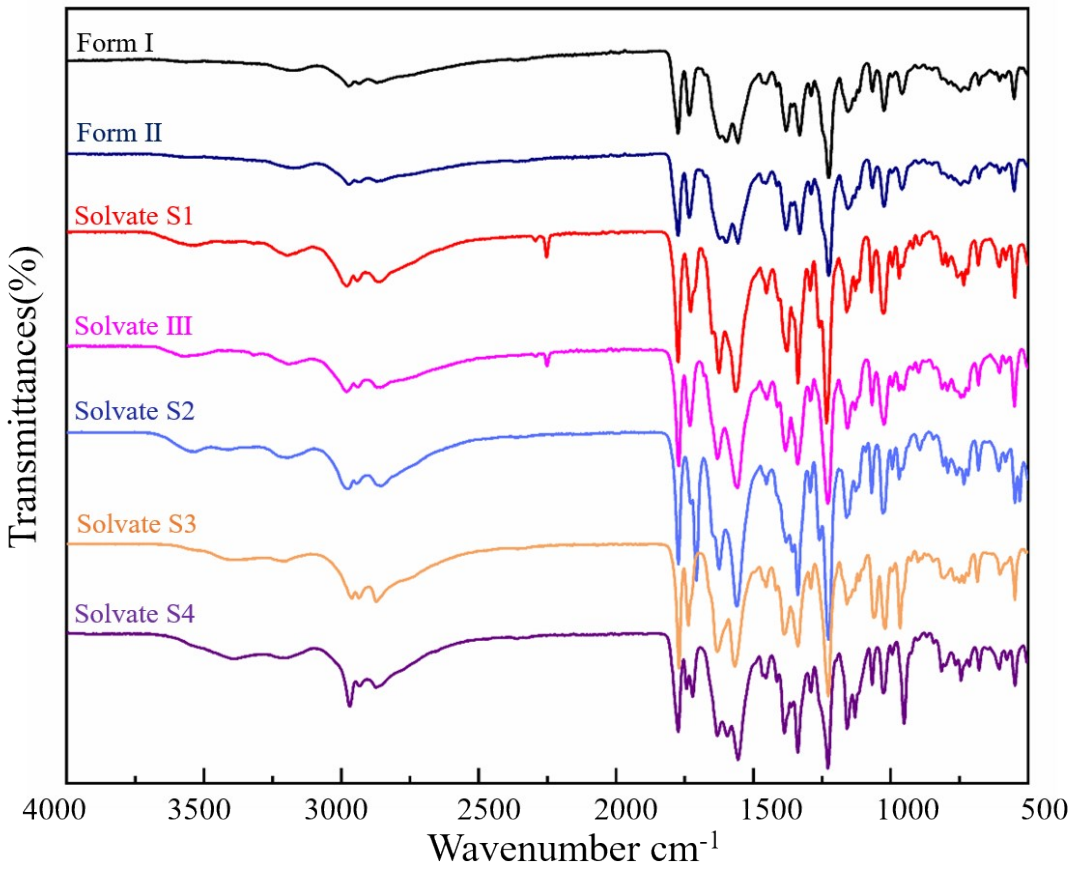

Fig. S1 FTIR spectra of various crystal forms of cefathiamidine.

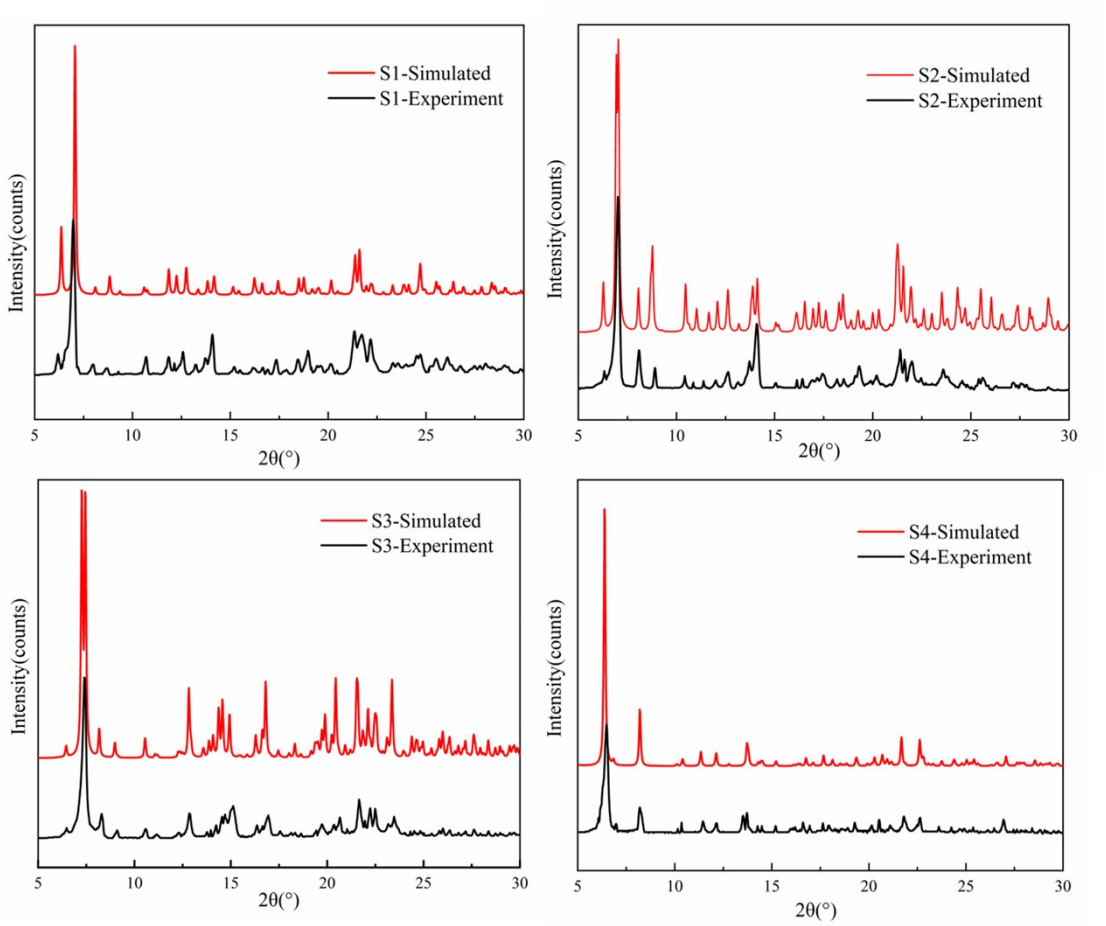

Fig. S2 The simulated and experimented PXRD of Solvate S1, S2, S3 and S4.

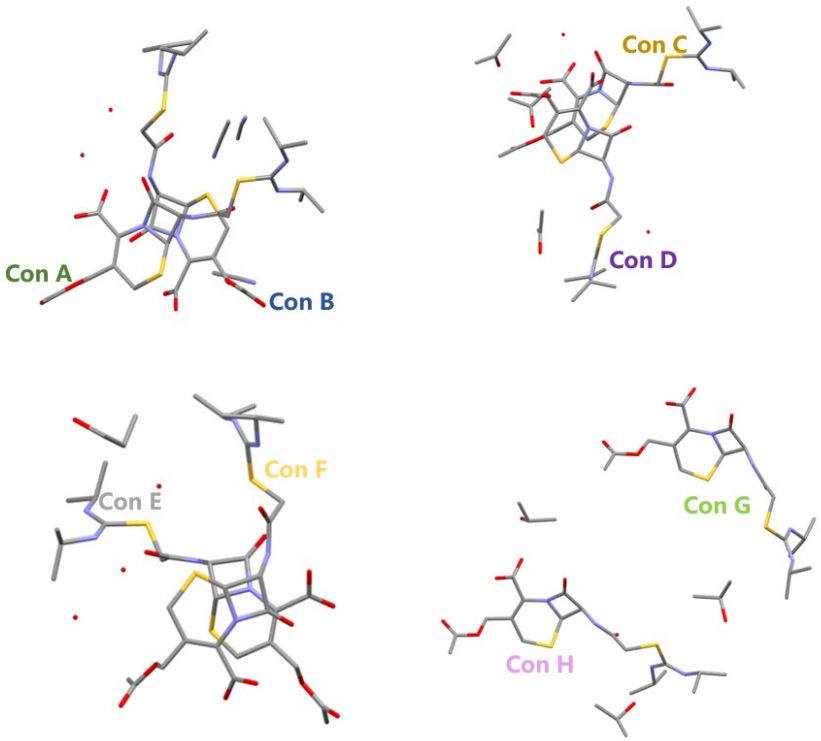

Fig. S3 Asymmetric units of Solvate S1(a), Solvate S2(b), Solvate S3(c) and Solvate S4(d). The H atoms are omitted for clarity.

Table S3. Hydrogen bonds data of different cefathiamidine solvates

Solvate	D-H···A	D-H (Å)	H···A (Å)	D···A (Å)	θ(DHA) (°)	Symop for A
S1	N1-H1···O1	0.88	1.90	2.742(4)	161	
	N5-H5A···O7	0.88	2.27	2.929(4)	132	
	N7-H7···O3	0.88	1.94	2.758(4)	153	
	N3-H3···O9	0.88	1.87	2.720(4)	163	1-x, -1/2+y, 1.5-z
	N2-H2···O4	0.88	1.92	2.778(4)	166	
	N6-H6···O10	0.88	2.10	2.931(4)	157	-1+x, y, z
	O14-H14B···O13	0.87	1.82	2.682(6)	169	-x, -1/2+y, 1.5-z

	O13-H13D···N11	0.87	2.17	3.03(1)	173	
	O14-H14A···O6	0.87	1.95	2.801(5)	167	
S2	N2-H2···O1	0.88	1.90	2.762(5)	167	
	N5-H5A···O7	0.88	2.03	2.844(5)	153	
	O16-H16B···O6	0.85	2.01	2.857(5)	174	
	O17-H17D···O16	0.86	1.91	2.768(7)	172	1/2+x, 1.5-y, 1-z
	O17-H17C···O14	0.86	2.22	2.992(7)	150	
	O16-H16A···O3	0.85	1.88	2.732(5)	177	
	N7-H7···O3	0.88	1.97	2.770(5)	151	
	N1-H1···O4	0.88	1.89	2.749(5)	165	
	N6-H6···O10	0.88	2.06	2.900(5)	159	
	N3-H3···O9	0.88	1.83	2.699(5)	170	
S3	N1-H1···O1	0.88	1.99	2.776(4)	148	
	N5-H5···O7	0.88	1.88	2.751(4)	172	
	N2-H2···O3	0.88	1.97	2.788(4)	153	-1+x, y, z
	N3-H3···O10	0.88	1.96	2.706(4)	142	
	N6-H6A···O10	0.851	1.93	2.784(4)	163	1/2-x, 1-y, -1/2+z
	N7-H7···O4	0.88	1.83	2.684(4)	164	
	O15-H15B···O6	0.86	2.08	2.921(7)	169	
	O15-H15A···O7	0.85	2.09	2.855(6)	150	
	O14-H14A···O15	0.85	2.30	2.839(9)	121	
	O13-H13···O9	0.84	1.94	2.774(5)	170	

S4	O14-H14···O3	0.84	1.96	2.79(2)	170	
	O15-H15···O6	0.84	2.63	2.96(2)	105	
	O13-H13···O10	0.84	1.96	2.792(9)	171	
	N5-H5A···O4	0.88	2.00	2.778(8)	146	
	N7-H7···O3	0.88	1.92	2.781(9)	168	
	N2-H2···O9	0.88	2.05	2.851(7)	151	x, 1+ y, z
	N3-H3···O9	0.88	1.94	2.798(9)	165	-y, x, 1/4+z

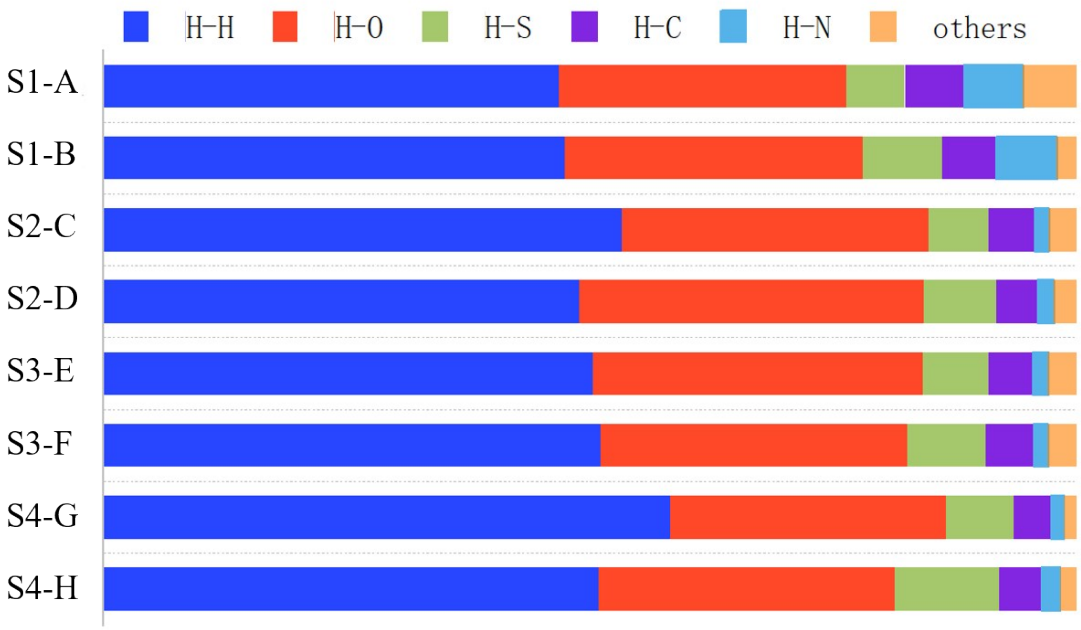

Fig. S4 The relative contributions of different interactions to the Hirshfeld surface.

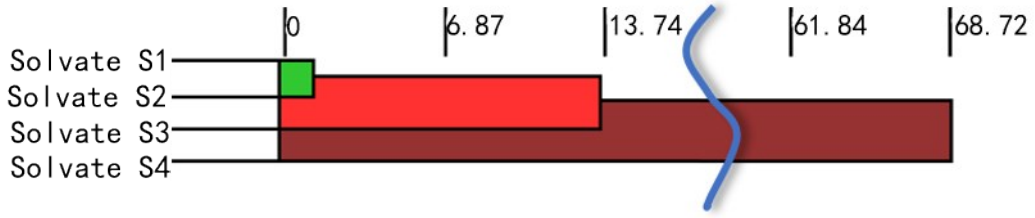

Fig. S5 The packing similarity tree diagram of the cefathiamidine solvates calculated using CrystalCMP. A part of the diagram between 13.74 and 61.84 was deleted to make the figure shorter and more readable which is indicated by blue curved line.

Table S4 Thermal analysis results

solvate	ratio	calculated weight loss, %	measured mass loss, %	Guest loss T_{on} (°C)	Resulting phase via heating	Total Energy (kJ/mol)
Acetonitrile solvate monohydrate S1	1:1.5: 1	14.4	14.6	30	Form I	1289.3
Acetone solvate monohydrate S2	1:1.5: 1	18.1	18.2	30	Form II	1249.8
N-propanol solvate 1.5 hydrate S3	1:0.5:1.5	10.8	10.5	48	Form I	1144.4
Isopropanol solvate S4	1:1	11.3	11.2	30	Amorphous	1502.5

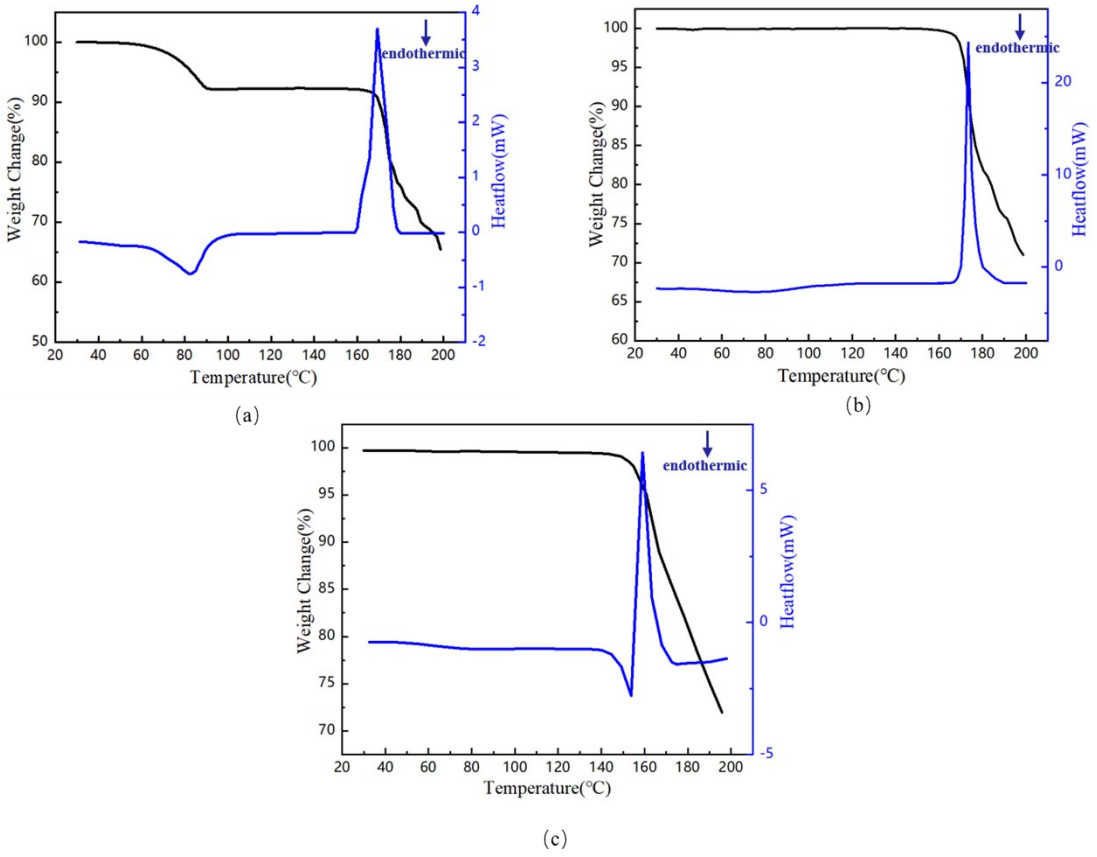

Figure S6. Thermogravimetric analysis (TGA) and differential scanning calorimetry (DSC) curves of cefathiamidine (a) solvate Ⅲ, (b) form Ⅰ and (c) form Ⅱ.