

## Supplementary Material

**Table S1.** Experimental conditions and results for gas hydrate in different concentrations

Particle Conc. (wt%)	Exp.no	Induction time (min)	Average induction time (min)	Gas Consumption (mmol/mol)	Average gas Consumption (mmol/mol)	Hydration reaction time(min)	Average hydration reaction time(min)	Gas Consumption rate (mmol/mol/min)	Average gas Consumption rate (mmol/mol/min)
0	G1-1	144.5	113.900	9.450	9.700	230.488	185.578	0.041	0.054
		78		9.480		178.868		0.053	
		119.2		10.169		147.377		0.069	
	G2-1	56.2	48.300	16.328	16.494	120.948	155.941	0.135	0.113
		49.5		15.461		125.699		0.123	
		39.2		17.694		221.175		0.080	
	G3-1	14.67	42.880	23.392	23.709	117.548	107.134	0.199	0.222
		39.8		25.654		103.028		0.249	
		74.17		22.081		100.826		0.219	
0.1	G1-2	4.3	3.433	8.983	11.873	62.382	92.229	0.144	0.135
		2.8		12.138		126.438		0.096	
		3.2		14.498		87.867		0.165	
	G2-2	7	8.867	20.199	16.575	69.412	76.395	0.291	0.221
		12.8		14.319		83.737		0.171	
		6.8		15.207		76.035		0.200	
	G3-2	12.5	5.833	26.310	26.223	82.219	73.995	0.320	0.360
		1.5		24.660		59.709		0.413	
		3.5		27.700		80.058		0.346	

1	G1-3	4.8	4.000	10.624	13.336	83.654	70.872	0.127	0.196
		3.7		14.238		70.485		0.202	
		3.5		15.146		58.479		0.259	
	G2-3	2.5	2.433	20.192	21.564	70.355	82.139	0.287	0.264
		2.3		22.255		90.837		0.245	
		2.5		22.244		85.226		0.261	
	G3-3	1.5	1.433	26.865	24.968	81.905	79.647	0.328	0.312
		1.5		28.367		84.175		0.337	
		1.3		19.672		72.859		0.270	
2	G1-4	1.8	5.267	8.107	10.803	33.500	47.950	0.242	0.229
		10.5		10.838		57.957		0.187	
		3.5		13.465		52.393		0.257	
	G2-4	3	2.600	21.960	21.416	63.103	59.033	0.348	0.363
		2.3		20.751		57.323		0.362	
		2.5		21.536		56.674		0.380	
	G3-4	2.8	2.967	27.934	27.141	71.260	67.032	0.392	0.410
		3.3		27.391		57.544		0.476	
		2.8		26.097		72.291		0.361	
3	G1-5	1.5	1.867	14.632	14.617	59.239	59.853	0.247	0.244
		2.8		14.433		61.417		0.235	
		1.3		14.785		58.904		0.251	
	G2-5	1.8	1.333	16.912	18.961	58.317	57.179	0.290	0.335
		1.2		19.460		49.517		0.393	

		1		20.512		63.702		0.322	
	G3-5	0.7	0.867	29.040	27.022	63.965	61.060	0.454	0.444
		0.7		26.624		64.937		0.410	
		1.2		25.402		54.278		0.468	