

**Choline chloride plus glycerol deep eutectic solvents as non-aqueous absorbents
for efficient absorption and recovery of HCl gas**

Zi-Teng Gao, Zhang-Min Li, Yan Zhou, Xue-Jun Shu, Zhao-Hui Xu, Duan-Jian Tao*

*National Engineering Research Center for Carbohydrate Synthesis, Key Laboratory of
Fluorine and Silicon for Energy Materials and Chemistry of Ministry of Education,
College of Chemistry and Chemical Engineering, Jiangxi Normal University,
Nanchang 330022 China.*

*Corresponding author: E-mail: djtao@jxnu.edu.cn (D. Tao)

HCl solubilities data

298.2 K, 1 bar	Mass (g)		
ChCl-Gly (1:1.5)	2.2671		
glass container	62.5564		
glass container+ ChCl-Gly (1:1.5)	64.8235		
glass container+ ChCl-Gly (1:1.5)+HCl	/	HCl solubility (g HCl/g DESs)	time (min)
15 v/v% HCl, 85 v/v% N ₂	65.0570	0.103	10
	65.1522	0.145	20
	65.2001	0.166	30
	65.2198	0.175	40
	65.2204	0.175	50
	65.2203	0.175	60
30 v/v% HCl, 70 v/v% N ₂	65.2876	0.205	30
	65.2874	0.205	40
	65.2881	0.205	50
40 v/v% HCl, 60 v/v% N ₂	65.3239	0.221	30
	65.3246	0.221	40
	65.3244	0.221	50
50 v/v% HCl, 50 v/v% N ₂	65.3713	0.242	30
	65.3720	0.242	40
	65.3721	0.242	50
60 v/v% HCl, 40 v/v% N ₂	65.4061	0.257	30
	65.4060	0.257	40
	65.4060	0.257	50
80 v/v% HCl, 20 v/v% N ₂	65.4854	0.292	30
	65.4855	0.292	40
	65.4853	0.292	50
100 v/v% HCl	65.5104	0.303	20
	65.5104	0.303	30
	65.5103	0.303	40
	65.5104	0.303	50

313.2 K, 1 bar	Mass (g)		
ChCl-Gly (1:1.5)	2.4017		
glass container	62.5559		
glass container+ ChCl-Gly (1:1.5)	64.9576		
glass container+ ChCl-Gly (1:1.5)+HCl	/	HCl solubility (g HCl/g DESs)	time (min)
15 v/v% HCl, 85 v/v% N ₂	65.2023	0.102	10
	65.2755	0.132	20
	65.277	0.133	30
	65.2771	0.133	40
30 v/v% HCl, 70 v/v% N ₂	65.3539	0.165	20
	65.3538	0.165	30
	65.3539	0.165	40
40 v/v% HCl, 60 v/v% N ₂	65.3785	0.175	20
	65.3781	0.175	30
	65.3786	0.175	40
50 v/v% HCl, 50 v/v% N ₂	65.4235	0.194	20
	65.4233	0.194	30
	65.4238	0.194	40
60 v/v% HCl, 40 v/v% N ₂	65.4763	0.216	20
	65.4759	0.216	30
	65.4761	0.216	40
80 v/v% HCl, 20 v/v% N ₂	65.5124	0.231	20
	65.5119	0.231	30
	65.5121	0.231	40
100 v/v% HCl	65.5384	0.242	20
	65.5379	0.242	30
	65.5381	0.242	40

323.2 K, 1 bar	Mass (g)		
ChCl-Gly (1:1.5)	2.202		
glass container	62.5553		
glass container+ ChCl-Gly (1:1.5)	64.7573		
glass container+ ChCl-Gly (1:1.5)+HCl	/	HCl solubility (g HCl/g DESs)	time (min)
15 v/v% HCl, 85 v/v% N ₂	64.9811	0.102	10
	64.9820	0.102	20
	64.9821	0.102	30
30 v/v% HCl, 70 v/v% N ₂	65.0571	0.136	10
	65.0568	0.136	20
	65.0569	0.136	30
40 v/v% HCl, 60 v/v% N ₂	65.0722	0.143	10
	65.0716	0.143	20
	65.0721	0.143	30
50 v/v% HCl, 50 v/v% N ₂	65.1118	0.161	10
	65.1120	0.161	20
	65.1116	0.161	30
60 v/v% HCl, 40 v/v% N ₂	65.1537	0.180	10
	65.1541	0.180	20
	65.1538	0.180	30
80 v/v% HCl, 20 v/v% N ₂	65.1769	0.191	10
	65.1776	0.191	20
	65.1775	0.191	30
100 v/v% HCl	65.2157	0.208	10
	65.2149	0.208	20
	65.2155	0.208	30

333.2 K, 1 bar	Mass (g)		
ChCl-Gly (1:1.5)	2.1403		
glass container	62.5561		
glass container+ ChCl-Gly (1:1.5)	64.6964		
glass container+ ChCl-Gly (1:1.5)+HCl	/	HCl solubility (g HCl/g DESs)	time (min)
15 v/v% HCl, 85 v/v% N ₂	64.8655	0.079	10
	64.8653	0.079	20
	64.8649	0.079	30
30 v/v% HCl, 70 v/v% N ₂	64.9361	0.112	10
	64.9358	0.112	20
	64.9359	0.112	30
40 v/v% HCl, 60 v/v% N ₂	64.9638	0.125	10
	64.9640	0.125	20
	64.9641	0.125	30
50 v/v% HCl, 50 v/v% N ₂	64.9874	0.136	10
	64.9879	0.136	20
	64.9875	0.136	30
60 v/v% HCl, 40 v/v% N ₂	65.0367	0.159	10
	65.0371	0.159	20
	65.0372	0.159	30
80 v/v% HCl, 20 v/v% N ₂	65.0453	0.163	10
	65.0451	0.163	20
	65.0451	0.163	30
100 v/v% HCl	65.0710	0.175	10
	65.0699	0.175	20
	65.0711	0.175	30