

Supporting information

Stability of cholinium chloride-based deep eutectic solvents with carboxylic acids: a study on ester formation

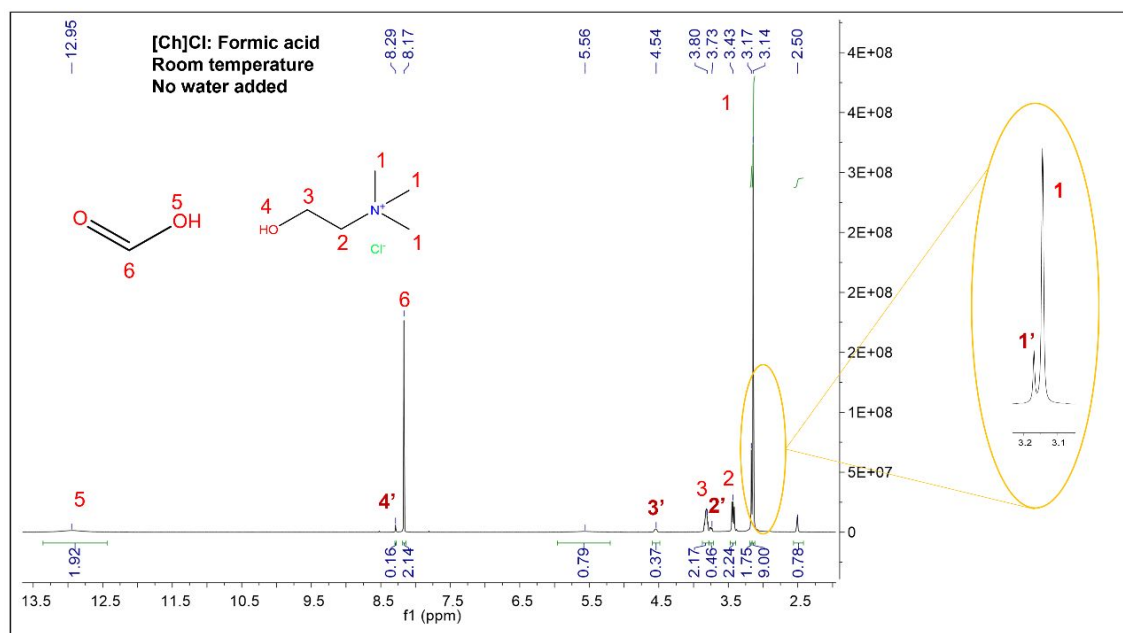
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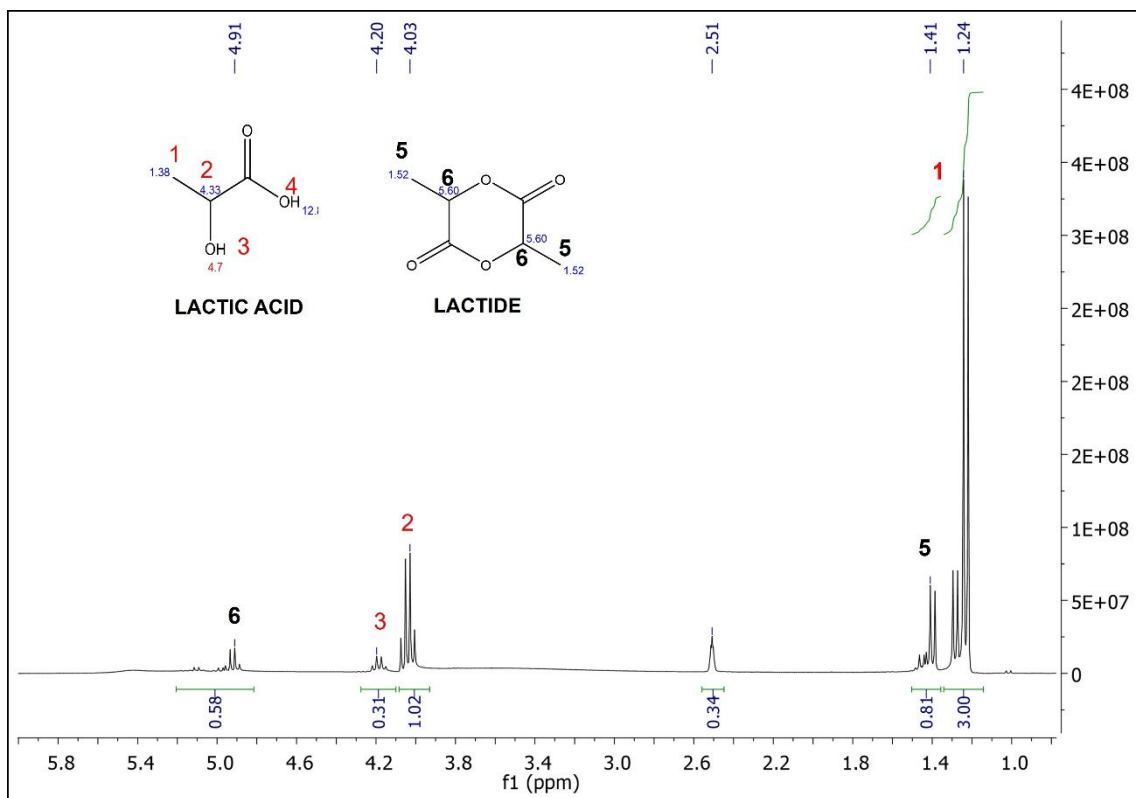
18 FIGURES



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20 **Figure S1.** ^1H -NMR spectra of DES [Ch]Cl: Formic acid prepared at 20 °C for 2 h
 21 without the addition of water. The signal at 0.78 corresponds to the characteristic signal
 22 of DMSO

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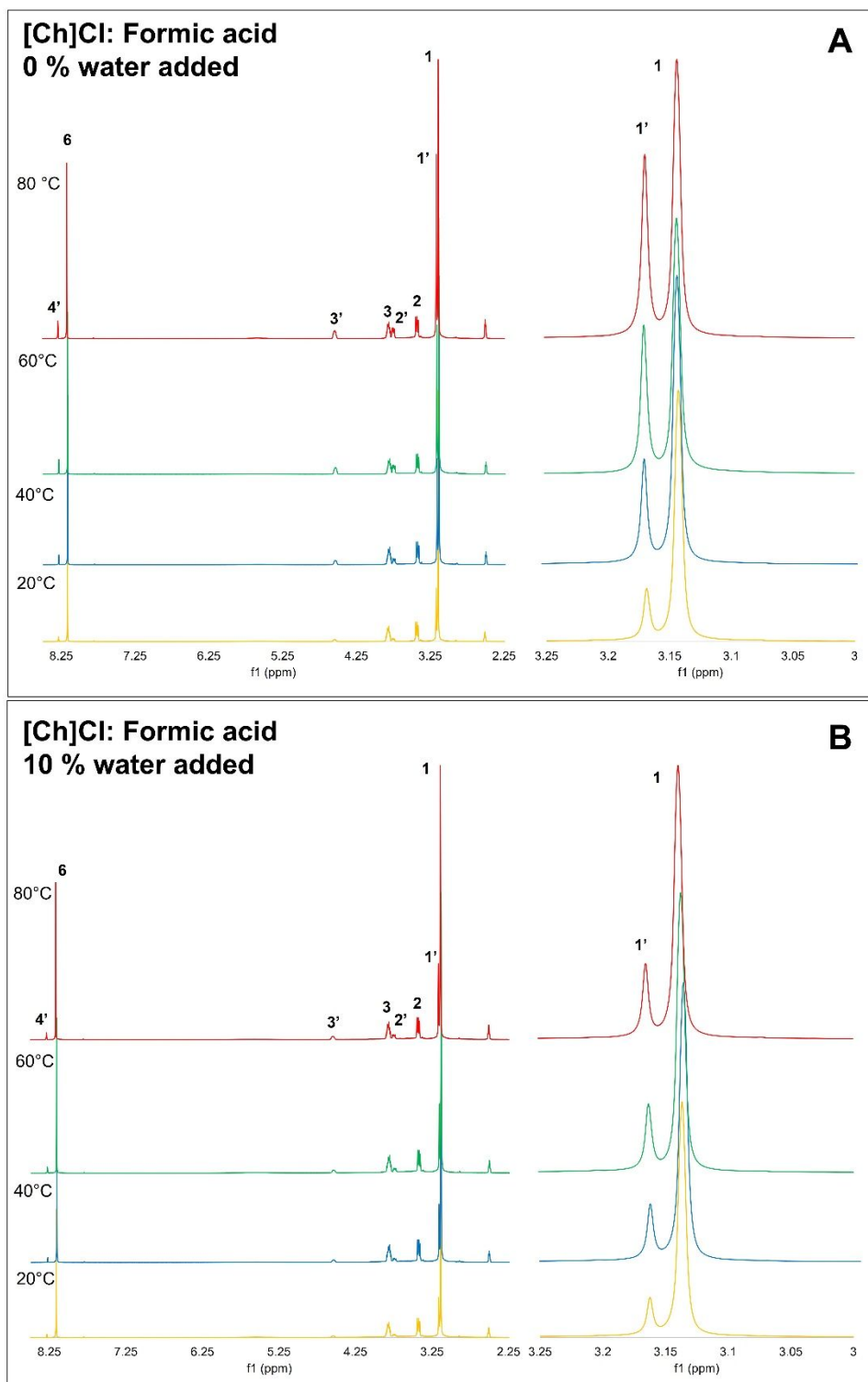


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25 **Figure S2.** ¹H-NMR spectrum of "pure" lactic acid (purity > 88-92 %).

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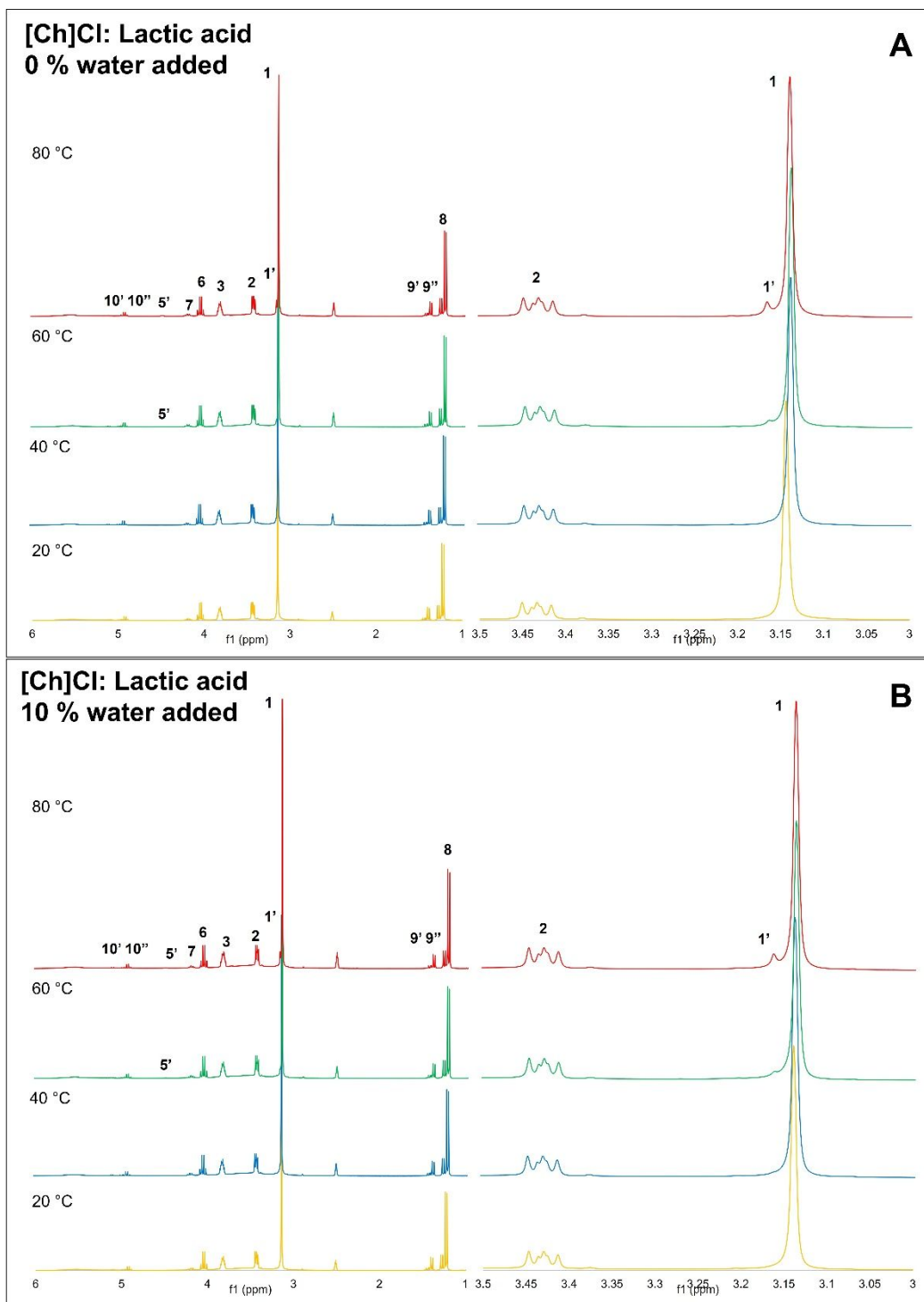
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29 **Figure S3.** H-NMR spectra for DES **(A)** without added water and **(B)** with 10% water.

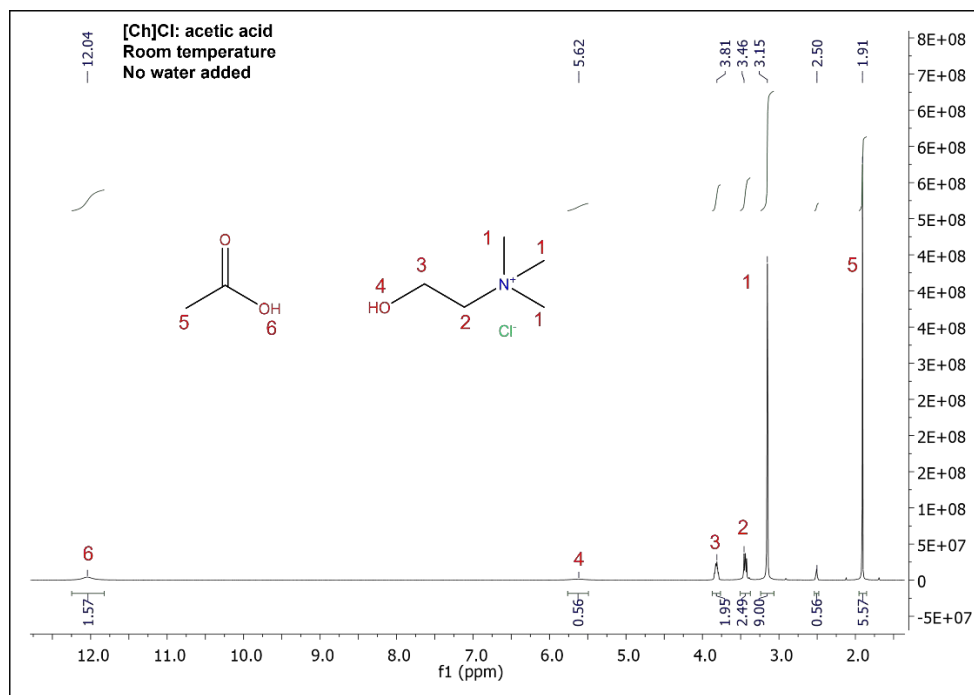
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32 **Figure S4.** ^1H -NMR spectra for DES **(A)** without added water and **(B)** with 10% water.

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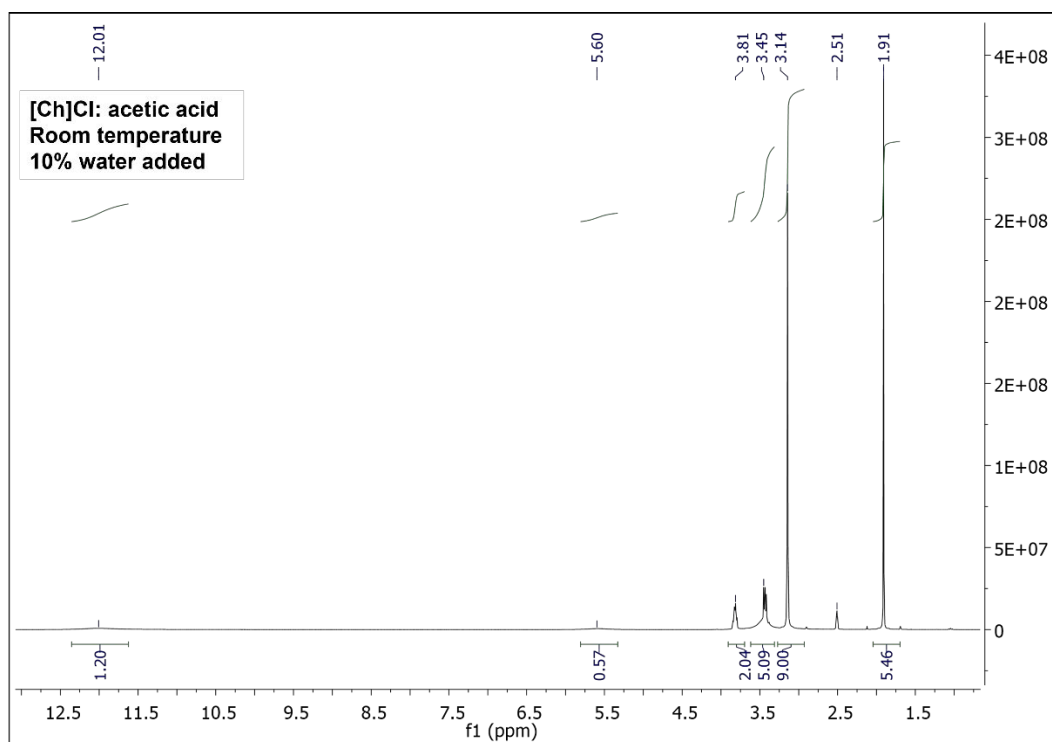
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35 **Figure S5.** $^1\text{H-NMR}$ spectra of DES [Ch]Cl: acetic acid prepared at 20 °C for 2 h

36 without the addition of water. No degradation effect was observed.

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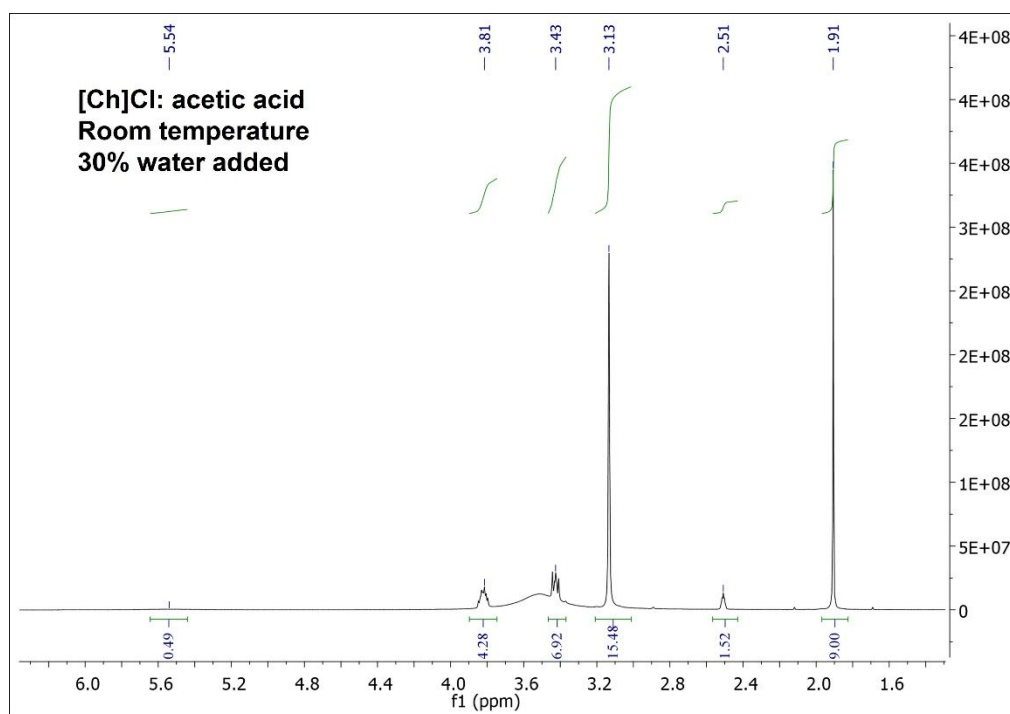


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40 **Figure S6.** $^1\text{H-NMR}$ spectra of DES [Ch]Cl: acetic acid prepared at 20 °C for 2 h with

41 the addition of 10% water. No degradation effect was observed.

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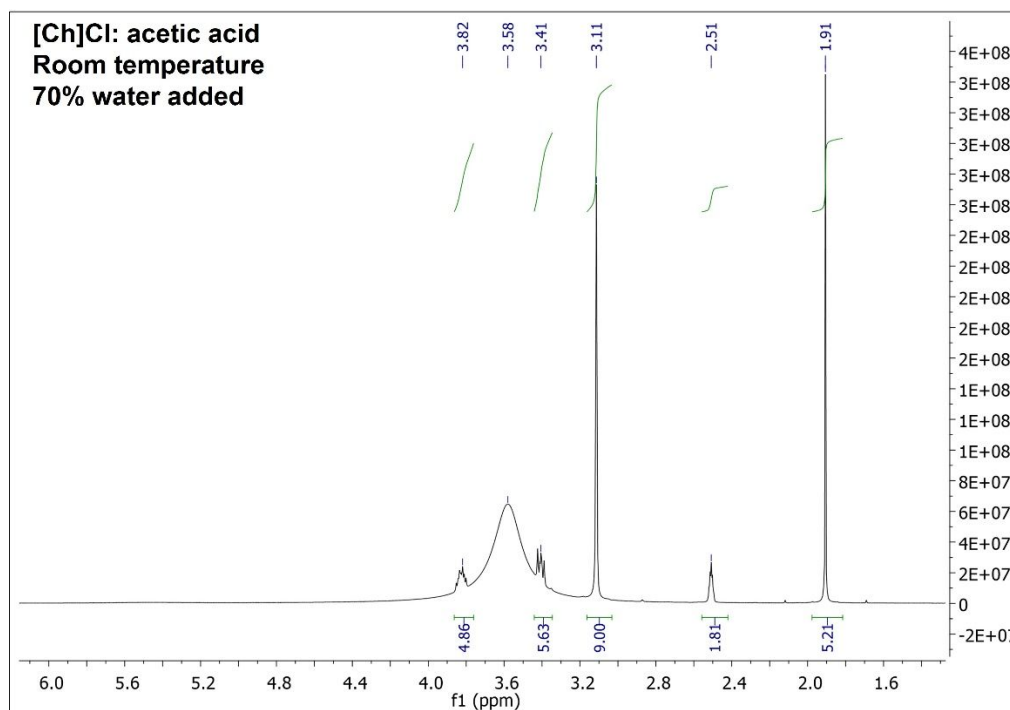


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44 **Figure S7.** ^1H -NMR spectra of DES of [Ch]Cl: acetic acid prepared at 20 °C for 2 h
45 with the addition of 30% water. No degradation effect was observed.

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49 **Figure S8.** ^1H -NMR spectra of DES [Ch]Cl: acetic acid prepared at 20 °C for 2 h with
50 the addition of 70% water. No degradation effect was observed.

51 **TABLES**

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53 **Table S1.** The effect of temperature on the esterification of DES without added water.

DES	x_{HBA:HBD}	%E [Ch]Cl (mol%)			
		20 °C	40 °C	60 °C	80 °C
[Ch]Cl: Acetic acid	01:02	0.00	0.00	2.00	4.50
[Ch]Cl: Formic acid	01:02	16.28	24.87	33.82	37.11
[Ch]Cl: Lactic acid	01:02	0.00	0.00	4.46	8.07
Lactide in [Ch]Cl:Lactic acid		18.75	19.16	18.54	18.53

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56 **Table S2.** The effect of temperature on the esterification of DES with 10% added water.

DES	x_{HBA:HBD}	%E [Ch]Cl (mol%)			
		20°C	40°C	60°C	80°C
[Ch]Cl: Acetic acid	01:02	0.00	0.00	1.98	4.24
[Ch]Cl: Formic acid	01:02	14.29	16.59	18.99	20.07
[Ch]Cl: Lactic acid	01:02	0.00	0.00	5.56	6.74
Lactide in [Ch]Cl:Lactic acid		18.88	19.92	19.2	16.72

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59 **Table S3.** The effect of storage time on DES prepared without added water at 20°C and
60 stored at room temperature.

DES	x_{HBA:HBD}	%E [Ch]Cl (mol%)			
		2 h	48 h	168 h	336 h
[Ch]Cl: Acetic acid	01:02	0.00	1.09	7.41	9.09
[Ch]Cl: Formic acid	01:02	16.28	17.05	36.66	39.23
[Ch]Cl: Lactic acid	01:02	0.00	0.00	7.41	9.73
Lactide in [Ch]Cl:Lactic acid		18.47	18.78	20.59	18.64

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