

# Supporting Information

## Isolation of Natural Red Colorants from Fermented Broth Using Ionic Liquid-based Aqueous Two-Phase Systems

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## Tables

**Table A.1.** Percentage of interference (%) on the protein quantification promoted by the presence of all the ILs tested in the extraction systems.

<b>Dilution factor</b>		<b>1/200</b>	<b>5/200</b>	<b>10/200</b>	<b>20/200</b>
<b>[N<sub>2,2,2,2</sub>]Br</b>	Top	4%	8%	15%	13%
	Bottom	23%	13%	18%	20%
<b>[N<sub>4,4,4,4</sub>]Br</b>	Top	3%	3%	4%	3%
	Bottom	0%	15%	11%	3%
<b>[C<sub>4</sub>mim]Cl</b>	Top	52%	59%	57%	52%
	Bottom	0%	36%	39%	26%

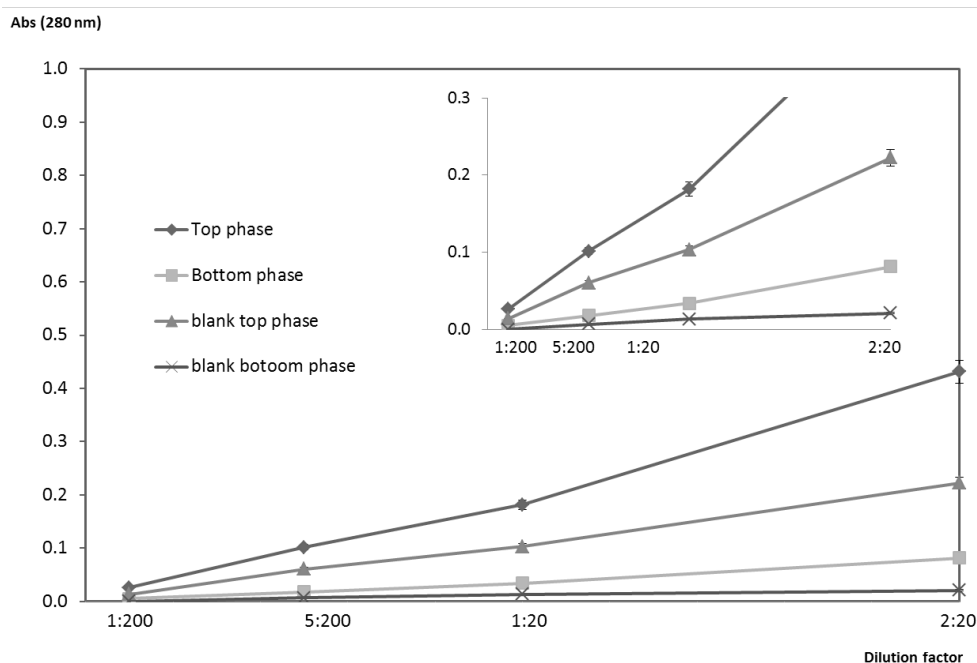
**Table A.2.** Average mass fractions percentage plus the respective standard deviation (wt%) used to prepare all systems studied, at 298 ( $\pm 1$ ) K.

Common conditions	Variable conditions	Mass fractions percentage $\pm$ std (wt%)		
		IL	citrate buffer	fermented broth
pH 7; TLL 88.6	[C <sub>4</sub> mim]Cl	37.2 $\pm$ 0.3	24.2 $\pm$ 0.2	9.3 $\pm$ 0.2
	[N <sub>4,4,4,4</sub> ]Br	40.3 $\pm$ 0.4	26.1 $\pm$ 0.1	10.1 $\pm$ 0.2
	[N <sub>2,2,2,2</sub> ]Br	40.1 $\pm$ 0.3	26.3 $\pm$ 0.2	10.07 $\pm$ 0.08
[N <sub>2,2,2,2</sub> ]Br; TLL 88.6	pH 6	36.35 $\pm$ 1.09	23.9 $\pm$ 0.6	9.7 $\pm$ 0.7
	pH 8	40.01 $\pm$ 0.12	26.32 $\pm$ 0.04	10.1 $\pm$ 0.1
[N <sub>2,2,2,2</sub> ]Br; pH 7	TLL 70.2	31.9 $\pm$ 0.3	26.3 $\pm$ 0.3	10.4 $\pm$ 0.5
	TLL 77.1	39.7 $\pm$ 0.5	20.896 $\pm$ 0.002	10.1 $\pm$ 0.2
<i>Blanks</i>	[C <sub>4</sub> mim]Cl; pH 7; TLL 88.6	37.3 $\pm$ 0.4	24.3 $\pm$ 0.2	----
	[N <sub>4,4,4,4</sub> ]Br; pH 7; TLL 88.6	39.85 $\pm$ 0.00	26.25 $\pm$ 0.00	----
	[N <sub>2,2,2,2</sub> ]Br; pH 7; TLL 88.6	39.920 $\pm$ 0.004	26.34 $\pm$ 0.09	----
	[N <sub>2,2,2,2</sub> ]Br; pH 6; TLL 88.6	37.0 $\pm$ 0.1	24.38 $\pm$ 0.09	----
	[N <sub>2,2,2,2</sub> ]Br; pH 8; TLL 88.6	39.95 $\pm$ 0.03	26.41 $\pm$ 0.00	----
	[N <sub>2,2,2,2</sub> ]Br; pH 7; TLL 70.2	31.784 $\pm$ 0.008	26.3 $\pm$ 0.2	----
	[N <sub>2,2,2,2</sub> ]Br; pH 7; P3	40.4 $\pm$ 0.2	20.85 $\pm$ 0.07	----

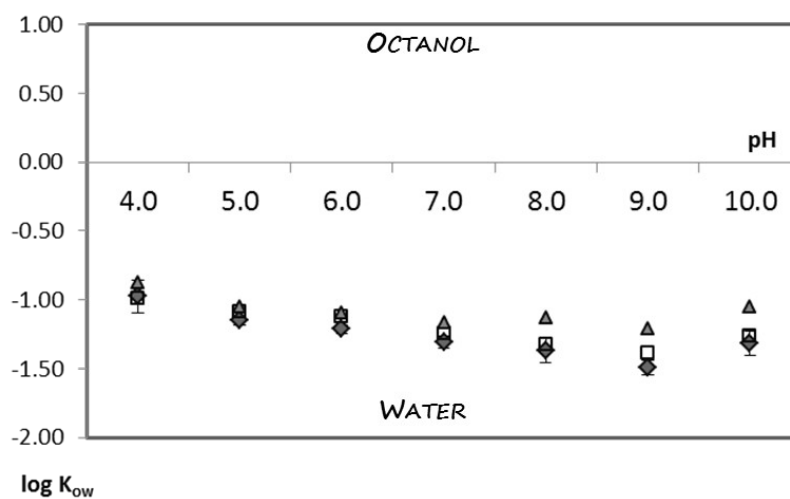
**Table A.3.** Mass fraction percentages (wt%) of IL + citrate buffer + water for all the TLL studied.

<b>TLL</b>	<b>Mass fraction percentage (wt%)</b>		
	<b>IL</b>	<b>citrate buffer</b>	<b>water</b>
<b>88.6</b>	68.41	1.74	29.85
<b>77.1</b>	61.10	3.30	35.60
<b>70.2</b>	57.11	4.45	38.44

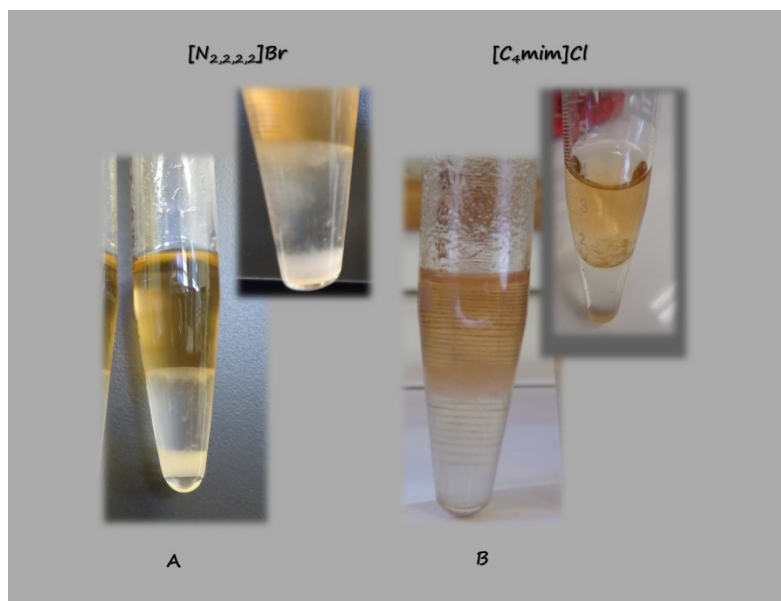
## Figures



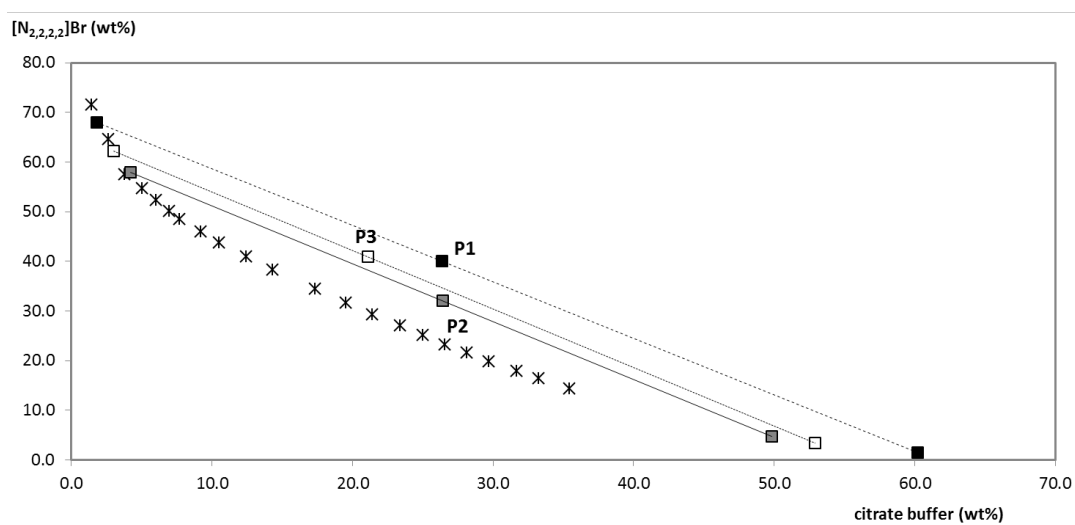
**Figure A.1.** Graphical representation of the Abs measured for the bottom and top phases considering the extraction systems with and without BSA (named as *blank*). The system reported is  $[C_4mim]Cl$  + citrate buffer + water at pH 7 and  $(298 \pm 1)$  K.



**Figure A.2.** Representation of the octanol-water partition coefficient results for the three dyes and different pH. Adaptation of the original image recently published [41].



**Figure A.3.** Identification of the physical separation of the proteins by denaturation: denatured protein in the bottom of the extraction tube (A) and/or in the top/bottom phases interface (A and B).



**Figure A.4.** Phase diagram for the ABS composed by  $[N_{2,2,2,2}]Br$  + citrate buffer (pH = 7.0) at  $(298 \pm 1)$  K: \*- binodal curve data; squares – TL data:  $\square$ - 40 wt% IL + 26 wt% citrate buffer,  $\square$ - 32 wt% IL + 26 wt% citrate buffer and  $\square$ - 40 wt% IL + 20 wt% citrate buffer. Adapted from our recent work [36].