Supporting Information

Use of Ionic Liquids as Co-Surfactants in Mixed Aqueous Micellar Two-Phase Systems to Improve the Simultaneous Separation of Immunoglobulin G and Human Serum Albumin from Expired Human Plasma

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Table S1. Coded and decoded matrices for the first 2^2 factorial planning carried out through a Response Surface Methodology for Triton X-114 and Tergitol 15-S-7.

Run	Coded Matrix		Decoded matrix	
	X_1 (Surfactant)	X_2 (Plasma)	wt% Surfactant	wt% Plasma
1	-1	-1	7	6
2	1	-1	13	6
3	-1	1	7	14
4	1	1	13	14
5	-1.41	0	5.8	10
6	1.41	0	14.2	10
7	0	-1.41	10	4.36
8	0	1.41	10	15.64
9	0	0	10	10
10	0	0	10	10
11	0	0	10	10

Table S2. Coded and decoded matrices for the second 2^2 factorial planning carried out through a Response Surface Methodology for Tergitol 15-S-7.

Run	Coded Matrix		Decoded matrix	
	X_1 (Surfactant)	X_2 (Plasma)	wt% Surfactant	wt% Plasma
1	-1	-1	16.0	6.00
2	1	-1	20.0	6.00
3	-1	1	16.0	14.0
4	1	1	20.0	14.0
5	-1.41	0	15.2	10.0
6	1.41	0	20.8	10.0
7	0	-1.41	18.0	4.36
8	0	1.41	18.0	15.6
9	0	0	18.0	10.0
10	0	0	18.0	10.0
11	0	0	18.0	10.0

Table S3. Experimental and fitted data of PF_{IgG} in the surfactant-poor phase (response variable) and respective residues with two-independent variables (surfactant and plasma concentration) for the system with Triton X-114.

Run	wt% Surfactant	wt% Plasma	PF_{IgG} Experimental values	PF_{IgG} Fitted values	Residues
1	7.00	6.00	1.321	1.189	0.132
2	13.0	6.00	1.040	1.011	0.028
3	7.00	14.0	1.079	1.068	0.011
4	13.0	14.0	0.923	1.016	-0.093
5	5.77	10.0	1.046	1.140	-0.094
6	14.2	10.0	1.032	0.978	0.054
7	10.0	4.36	1.017	1.123	-0.106
8	10.0	15.6	1.106	1.040	0.066
9	10.0	10.0	0.926	0.953	-0.027
10	10.0	10.0	0.928	0.953	-0.025
11	10.0	10.0	1.006	0.953	0.053

Table S4. Experimental and fitted data of PF_{IgG} in the surfactant-rich phase (response variable) and respective residues with two-independent variables (surfactant and plasma concentration) for the system with Triton X-114.

Run	wt% Surfactant	wt% Plasma	PF_{IgG} Experimental values	PF_{IgG} Fitted values	Residues
1	7.00	6.00	0.939	0.979	-0.040
2	13.0	6.00	0.990	0.983	0.007
3	7.00	14.0	0.951	0.938	0.014
4	13.0	14.0	1.087	1.026	0.061
5	5.77	10.0	0.984	0.961	0.023
6	14.2	10.0	0.982	1.025	-0.044
7	10.0	4.36	0.997	0.970	0.028
8	10.0	15.6	0.923	0.971	-0.048
9	10.0	10.0	1.033	1.049	-0.016
10	10.0	10.0	1.116	1.049	0.067
11	10.0	10.0	0.998	1.049	-0.051

Table S5. Experimental and fitted data of PF_{HSA} in the surfactant-poor phase (response variable) and respective residues with two-independent variables (surfactant and plasma concentration) for the system with Triton X-114.

Run	wt% Surfactant	wt% Plasma	PF_{HSA} Experimental values	PF_{HSA} Fitted values	Residues
1	7.00	6.00	0.786	0.802	-0.016
2	13.0	6.00	0.971	0.946	0.024
3	7.00	14.0	0.904	0.884	0.020
4	13.0	14.0	0.857	0.797	0.060
5	5.77	10.0	0.846	0.839	0.006
6	14.2	10.0	0.828	0.879	-0.051
7	10.0	4.36	0.883	0.880	0.003
8	10.0	15.6	0.784	0.832	-0.048
9	10.0	10.0	0.874	0.874	0.001
10	10.0	10.0	0.888	0.874	0.015
11	10.0	10.0	0.859	0.874	-0.015

Table S6. Experimental and fitted data of PF_{HSA} in the surfactant-rich phase (response variable) and respective residues with two-independent variables (surfactant and plasma concentration) for the system with Triton X-114.

Run	wt% Surfactant	wt% Plasma	PF_{HSA} Experimental values	PF_{HSA} Fitted values	Residues
1	7.00	6.00	1.040	1.015	0.026
2	13.0	6.00	1.008	1.015	-0.007
3	7.00	14.0	1.059	1.057	0.002
4	13.0	14.0	0.993	1.023	-0.031
5	5.77	10.0	1.013	1.034	-0.021
6	14.2	10.0	1.036	1.010	0.026
7	10.0	4.36	1.002	1.016	-0.014
8	10.0	15.6	1.070	1.051	0.019
9	10.0	10.0	1.009	1.037	-0.028
10	10.0	10.0	1.083	1.037	0.047
11	10.0	10.0	1.018	1.037	-0.019

Table S7. Experimental and fitted data of PF_{IgG} in the surfactant-poor phase (response variable) and respective residues with two-independent variables (surfactant and plasma concentration) for the system with Tergitol 15-S-7.

Run	wt% Surfactant	wt% Plasma	PF_{IgG} Experimental values	PF_{IgG} Fitted values	Residues
1	7.00	6.00	0.606	0.799	-0.194
2	13.0	6.00	1.156	1.242	-0.086
3	7.00	14.0	1.140	1.225	-0.085
4	13.0	14.0	1.171	1.147	0.023
5	5.77	10.0	1.113	0.950	0.162
6	14.2	10.0	1.216	1.207	0.009
7	10.0	4.36	1.175	1.012	0.163
8	10.0	15.6	1.254	1.246	0.008
9	10.0	10.0	1.217	1.217	0.000
10	10.0	10.0	1.190	1.217	-0.027
11	10.0	10.0	1.242	1.217	0.025

Table S8. Experimental and fitted data of PF_{IgG} in the surfactant-rich phase (response variable) and respective residues with two-independent variables (surfactant and plasma concentration) for the system with Tergitol 15-S-7.

Run	wt% Surfactant	wt% Plasma	PF_{IgG} Experimental values	PF_{IgG} Fitted values	Residues
1	7.00	6.00	0.576	0.585	-0.009
2	13.0	6.00	0.613	0.590	0.023
3	7.00	14.0	0.512	0.508	0.003
4	13.0	14.0	0.615	0.580	0.036
5	5.77	10.0	0.561	0.552	0.009
6	14.2	10.0	0.570	0.606	-0.036
7	10.0	4.36	0.579	0.584	-0.005
8	10.0	15.6	0.501	0.523	-0.022
9	10.0	10.0	0.646	0.620	0.026
10	10.0	10.0	0.629	0.620	0.009
11	10.0	10.0	0.585	0.620	-0.034

Table S9 Experimental and fitted data of PF_{HSA} in the surfactant-poor phase (response variable) and respective residues with two-independent variables (surfactant and plasma concentration) for the system with Tergitol 15-S-7.

Run	wt% Surfactant	wt% Plasma	PF_{HSA} Experimental values	PF_{HSA} Fitted values	Residues
1	7.00	6.00	1.032	0.988	0.043
2	13.0	6.00	0.828	0.816	0.012
3	7.00	14.0	0.899	0.875	0.024
4	13.0	14.0	0.837	0.844	-0.007
5	5.77	10.0	0.915	0.956	-0.041
6	14.2	10.0	0.817	0.813	0.004
7	10.0	4.36	0.875	0.907	-0.032
8	10.0	15.6	0.842	0.847	-0.005
9	10.0	10.0	0.837	0.854	-0.017
10	10.0	10.0	0.868	0.854	0.014
11	10.0	10.0	0.857	0.854	0.003

Table S10. Experimental and fitted data of PF_{HSA} in the surfactant-rich phase (response variable) and respective residues with two-independent variables (surfactant and plasma concentration) for the system with Tergitol 15-S-7.

Run	wt% Surfactant	wt% Plasma	PF_{HSA} Experimental values	PF_{HSA} Theorical values	Residues
1	7.00	6.00	0.980	0.953	0.028
2	13.0	6.00	0.980	0.957	0.024
3	7.00	14.0	0.986	1.027	-0.042
4	13.0	14.0	1.058	1.104	-0.046
5	5.77	10.0	1.014	1.008	0.006
6	14.2	10.0	1.076	1.064	0.012
7	10.0	4.36	0.866	0.906	-0.040
8	10.0	15.6	1.121	1.063	0.058
9	10.0	10.0	1.032	1.024	0.008
10	10.0	10.0	0.980	1.024	-0.044
11	10.0	10.0	1.059	1.024	0.035

Table S11. Regression coefficients and standard deviation of the 2^2 factorial planning developed for the PF_{IgG} in the surfactant-poor phase using Triton X-114.

	Regression Coefficient	Std. deviation	t-student (5)	*p*-value
Interception	2.474	0.766	3.231	0.023
wt% Surfactant	-0.164	0.112	-1.465	0.203
wt% Surfactant^2	0.006	0.005	1.167	0.296
wt% Plasma	-0.114	0.073	-1.560	0.180
wt% Plasma^2	0.004	0.003	1.417	0.216
wt% Surfactant x wt% Plasma	0.003	0.004	0.582	0.586

Table S12. Regression coefficients and standard deviation of the 2^2 factorial planning developed for the PF_{IgG} in the surfactant-rich phase using Triton X-114.

	Regression Coefficient	Std. deviation	t-student (5)	*p*-value
Interception	0.591	0.432	1.370	0.229
wt% Surfactant	0.052	0.063	0.828	0.445
wt% Surfactant^2	-0.003	0.003	-1.089	0.326
wt% Plasma	0.032	0.041	0.766	0.478
wt% Plasma^2	-0.002	0.002	-1.532	0.186
wt% Surfactant x wt% Plasma	0.002	0.003	0.699	0.516

Table S13. Regression coefficients and standard deviation of the 2^2 factorial planning developed for the PF_{HSA} in the surfactant-poor phase using Triton X-114.

	Regression Coefficient	Std. deviation	t-student (5)	*p*-value
Interception	0.250	0.322	0.778	0.472
wt% Surfactant	0.069	0.047	1.468	0.202
wt% Surfactant^2	-0.001	0.002	-0.373	0.724
wt% Plasma	0.055	0.031	1.796	0.132
wt% Plasma^2	-0.001	0.001	-0.471	0.658
wt% Surfactant x wt% Plasma	-0.005	0.002	-2.552	0.051

Table S14. Regression coefficients and standard deviation of the 2^2 factorial planning developed for the PF_{HSA} in the surfactant-rich phase using Triton X-114.

	Regression Coefficient	Std. deviation	t-student (5)	*p*-value
Interception	0.869	0.257	3.376	0.020
wt% Surfactant	0.021	0.038	0.559	0.600
wt% Surfactant^2	-0.001	0.002	-0.493	0.643
wt% Plasma	0.012	0.025	0.498	0.639
wt% Plasma^2	0.000	0.001	-0.110	0.916
wt% Surfactant x wt% Plasma	-0.001	0.002	-0.463	0.663

Table S15. Regression coefficients and standard deviation of the 2^2 factorial planning developed for the PF_{IgG} in the surfactant-poor phase using Tergitol 15-S-7.

	Regression Coefficient	Std. deviation	t-student (5)	*p*-value
Interception	-1.426	1.037	-1.375	0.227
wt% Surfactant	0.293	0.151	1.940	0.110
wt% Surfactant^2	-0.008	0.007	-1.126	0.311
wt% Plasma	0.184	0.099	1.858	0.122
wt% Plasma^2	-0.003	0.004	-0.716	0.506
wt% Surfactant x wt% Plasma	-0.011	0.006	-1.778	0.136

Table S16. Regression coefficients and standard deviation of the 2^2 factorial planning developed for the PF_{IgG} in the surfactant-rich phase using Tergitol 15-S-7.

	Regression Coefficient	Std. deviation	t-student (5)	*p*-value
Interception	0.309	0.240	1.285	0.255
wt% Surfactant	0.039	0.035	1.099	0.322
wt% Surfactant^2	-0.002	0.002	-1.441	0.209
wt% Plasma	0.023	0.023	0.986	0.370
wt% Plasma^2	-0.002	0.001	-2.336	0.067
wt% Surfactant x wt% Plasma	0.001	0.001	0.972	0.376

Table S17. Regression coefficients and standard deviation of the 2^2 factorial planning developed for the PF_{HSA} in the surfactant-poor phase using Tergitol 15-S-7.

	Regression Coefficient	Std. deviation	t-student (5)	*p*-value
Interception	1.612	0.243	6.622	0.001
wt% Surfactant	-0.080	0.035	-2.261	0.073
wt% Surfactant^2	0.002	0.002	1.053	0.340
wt% Plasma	-0.049	0.023	-2.110	0.089
wt% Plasma^2	0.001	0.001	0.792	0.465
wt% Surfactant x wt% Plasma	0.003	0.001	2.059	0.095

Table S18. Regression coefficients and standard deviation of the 2^2 factorial planning developed for the PF_{HSA} in the surfactant-rich phase using Tergitol 15-S-7.

	Regression Coefficient	Std. deviation	t-student (5)	*p*-value
Interception	0.912	0.370	2.462	0.057
wt% Surfactant	-0.022	0.054	-0.402	0.704
wt% Surfactant^2	0.001	0.002	0.273	0.796
wt% Plasma	0.024	0.035	0.667	0.535
wt% Plasma^2	-0.001	0.001	-0.900	0.409
wt% Surfactant x wt% Plasma	0.002	0.002	0.693	0.519

In addition to the PF, each AMTPS separation performance was also analyzed considering the partition coefficient (*K*) of each protein, as determined by Eq. S1

$$K = \frac{[protein]_{surfactant-poor\ phase}}{[protein]_{surfactant-rich\ phase}} \quad \text{(S1)}$$

where $[protein]_{surfactant\text{-}poor\ phase}$ and $[protein]_{surfactant\text{-}rich\ phase}$ represent the concentration of each protein in $mg.mL^{-1}$ in the surfactant-poor and surfactant-rich phases, respectively. However, it is noteworthy to mention that K is highly influenced by the volume of each phase. In the particular case of AMTPS, there is a considerable difference within the volumes of distinct phases.

Table S19. IgG and HSA partition coefficient (K) in Tergitol 15-S-7-based AMTPS.

Run	wt% Surfactant	wt% Plasma	K_{IgG}	K_{HSA}
1	7.00	6.00	1.00	1.07
2	13.0	6.00	5.46	4.90
3	7.00	14.0	6.40	5.70
4	13.0	14.0	8.55	6.32
5	5.77	10.0	8.43	9.74
6	14.2	10.0	14.46	9.93
7	10.0	4.36	4.02	5.56
8	10.0	15.6	8.91	15.63
9	10.0	10.0	8.59	8.03
10	10.0	10.0	6.08	5.82
11	10.0	10.0	6.84	5.87

Table S20. Experimental and fitted data of PF_{IgG} in the surfactant-poor phase (response variable) after the second 2^2 factorial planning has been carried out towards the two-independent variables (surfactant and plasma concentration) for Tergitol 15-S-7.

Run	wt% Surfactant	wt% Plasma	PF_{IgG} Experimental values	PF_{IgG} Fitted values	Residues
1	16.00	6.00	1.166	1.080	0.086
2	20.00	6.00	1.077	0.839	0.238
3	16.00	14.00	1.307	1.317	-0.010
4	20.00	14.00	1.246	1.103	0.143
5	15.18	10.00	1.263	1.270	-0.007
6	20.82	10.00	0.725	0.949	-0.223
7	18.00	4.36	0.702	0.885	-0.183
8	18.00	15.64	1.191	1.238	-0.047
9	18.00	10.00	1.204	1.173	0.031
10	18.00	10.00	1.197	1.173	0.024
11	18.00	10.00	1.120	1.173	-0.053

Table S21. Experimental and fitted data of PF_{IgG} in the surfactant-rich phase (response variable) after the second 2^2 factorial planning has been carried towards the two-independent variables (surfactant and plasma concentration) for Tergitol 15-S-7.

Run	wt% Surfactant	wt% Plasma	PF_{IgG} Experimental values	PF_{IgG} Fitted values	Residues
1	16.00	6.00	0.784	0.759	0.025
2	20.00	6.00	1.181	1.101	0.080
3	16.00	14.00	0.856	0.848	0.008
4	20.00	14.00	0.711	0.649	0.063
5	15.18	10.00	0.796	0.801	-0.005
6	20.82	10.00	0.819	0.902	-0.083
7	18.00	4.36	0.897	0.954	-0.056
8	18.00	15.64	0.666	0.698	-0.032
9	18.00	10.00	0.854	0.754	0.100
10	18.00	10.00	0.696	0.754	-0.057
11	18.00	10.00	0.712	0.754	-0.042

Table S22. Experimental and fitted data of PF_{HSA} in the surfactant-poor phase (response variable) after the second 2^2 factorial planning has been carried towards the two-independent variables (surfactant and plasma concentration) for Tergitol 15-S-7.

Run	wt% Surfactant	wt% Plasma	PF_{HSA} Experimental values	PF_{HSA} Fitted values	Residues
1	16.00	6.00	0.829	0.661	0.168
2	20.00	6.00	0.908	0.642	0.266
3	16.00	14.00	0.723	0.831	-0.109
4	20.00	14.00	0.440	0.452	-0.011
5	15.18	10.00	0.811	0.821	-0.010
6	20.82	10.00	0.392	0.540	-0.148
7	18.00	4.36	0.344	0.619	-0.276
8	18.00	15.64	0.723	0.605	0.118
9	18.00	10.00	0.670	0.661	0.009
10	18.00	10.00	0.686	0.661	0.025
11	18.00	10.00	0.629	0.661	-0.032

Table S23. Experimental and fitted data of PF_{HSA} in the surfactant-rich phase (response variable) after the second 2^2 factorial planning has been carried towards the two-independent variables (surfactant and plasma concentration) for Tergitol 15-S-7.

Run	wt% Surfactant	wt% Plasma	PF_{HSA} Experimental values	PF_{HSA} Fitted values	Residues
1	16.00	6.00	1.029	1.020	0.009
2	20.00	6.00	0.684	0.722	-0.038
3	16.00	14.00	0.991	0.987	0.004
4	20.00	14.00	0.922	0.965	-0.043
5	15.18	10.00	1.013	1.030	-0.017
6	20.82	10.00	0.854	0.804	0.051
7	18.00	4.36	0.870	0.857	0.014
8	18.00	15.64	1.025	1.004	0.020
9	18.00	10.00	0.913	0.962	-0.048
10	18.00	10.00	0.978	0.962	0.016
11	18.00	10.00	0.993	0.962	0.031

Table S24. Regression coefficients and standard deviation of the second 2^2 factorial planning developed for PF_{IgG} in the surfactant-poor phase using Tergitol 15-S-7.

	Regression Coefficient	Std. deviation	t-student (5)	*p*-value
Interception	-0.908	6.839	-0.133	0.900
wt% Surfactant	0.223	0.721	0.309	0.770
wt% Surfactant^2	-0.008	0.020	-0.406	0.702
wt% Plasma	0.086	0.233	0.369	0.727
wt% Plasma^2	-0.004	0.005	-0.709	0.510
wt% Surfactant x wt% Plasma	0.001	0.012	0.072	0.945

Table S25. Regression coefficients and standard deviation of the second 2^2 factorial planning developed for PF_{IgG} in the surfactant-rich phase using Tergitol 15-S-7.

	Regression Coefficient	Std. deviation	t-student (5)	*p*-value
Interception	1.827	3.158	0.579	0.588
wt% Surfactant	-0.256	0.333	-0.769	0.477
wt% Surfactant^2	0.012	0.009	1.350	0.235
wt% Plasma	0.237	0.108	2.202	0.079
wt% Plasma^2	0.002	0.002	0.994	0.366
wt% Surfactant x wt% Plasma	-0.017	0.005	-3.139	0.026

Table S26. Regression coefficients and standard deviation of the second 2^2 factorial planning developed for PF_{HSA} in the surfactant-poor phase using Tergitol 15-S-7.

	Regression Coefficient	Std. deviation	t-student (5)	*p*-value
Interception	0.209	7.763	0.027	0.980
wt% Surfactant	-0.028	0.818	-0.035	0.974
wt% Surfactant^2	0.003	0.022	0.113	0.914
wt% Plasma	0.232	0.264	0.879	0.420
wt% Plasma^2	-0.002	0.006	-0.272	0.797
wt% Surfactant x wt% Plasma	-0.011	0.013	-0.851	0.434

Table S27. Regression coefficients and standard deviation of the second 2^2 factorial planning developed for PF_{HSA} in the surfactant-rich phase using Tergitol 15-S-7.

	Regression Coefficient	Std. deviation	t-student (5)	*p*-value
Interception	1.174	1.671	0.702	0.514
wt% Surfactant	0.077	0.176	0.438	0.680
wt% Surfactant^2	-0.006	0.005	-1.172	0.294
wt% Plasma	-0.123	0.057	-2.154	0.084
wt% Plasma^2	-0.001	0.001	-0.812	0.454
wt% Surfactant x wt% Plasma	0.009	0.003	3.021	0.029

Table S28. IgG and HSA partition coefficient (K) in the second 2^2 factorial planning developed for Tergitol 15-S-7-based AMTPS.

Run	wt% Surfactant	wt% Plasma	K_{IgG}	K_{HSA}
1	16.00	6.00	5.68	5.99
2	20.00	6.00	2.83	5.92
3	16.00	14.00	9.56	6.68
4	20.00	14.00	11.58	4.03
5	15.18	10.00	6.17	4.87
6	20.82	10.00	3.69	2.27
7	18.00	4.36	3.96	2.79
8	18.00	15.64	8.41	4.21
9	18.00	10.00	5.64	3.52
10	18.00	10.00	8.41	4.66
11	18.00	10.00	7.18	3.59

Note: It should be taken into account that the partition coefficient is highly influenced by the volume of each phase, which in AMTPS is considerable.

Table S29. Effect of different pH values on the PF_{IgG} in the surfactant-rich phase and on the PF_{HSA} in the surfactant-poor phase and on the IgG and HSA yields the respective phases, using plasma from donor #2. Partition coefficient (K) is also shown.

pH	$IgG_{surfactant\text{-}rich\ phase}$		$HSA_{surfactant\text{-}poor\ phase}$		K	
	PF + σ	(Yield + σ)/%	PF + σ	(Yield + σ)/%	IgG	HSA
6.0	0.77 ± 0.05	56 ± 2	0.64 ± 0.01	29 ± 2	7.9 ± 0.6	5.1 ± 0.2
7.0	0.59 ± 0.04	32 ± 2	0.84 ± 0.02	58 ± 2	8.2 ± 0.7	8.1 ± 0.2
8.0	0.53 ± 0.04	22 ± 2	0.94 ± 0.01	75 ± 3	8.1 ± 0.2	13 ± 2

Note: It should be taken into account that the partition coefficient is highly influenced by the volume of each phase, which in AMTPS is considerable.

Table S30. Influence of the SAILs incorporation in the micelles upon the IgG and HSA PF and yield (%) in the surfactant-rich and surfactant- poor phases, respectively, using plasma from donor #2. Partition coefficient (K) is also shown.

AMTPS	$IgG_{surfactant\text{-}rich\ phase}$		$HSA_{surfactant\text{-}poor\ phase}$		K	
	PF + σ	(Yield + σ)/%	PF + σ	(Yield + σ)/%	IgG	HSA
Without SAIL	0.53 ± 0.04	22 ± 2	0.94 ± 0.01	75 ± 3	8.1 ± 0.2	13 ± 2
$[C_{14}mim]Cl$	0.56 ± 0.04	32 ± 2	0.85 ± 0.03	60 ± 1	8.4 ± 0.3	8.1 ± 0.7
$[P_{4,4,4,14}]Cl$	0.489 ± 0.003	24.0 ± 0.1	0.924 ± 0.002	73 ± 5	8.2 ± 0.2	11.2 ± 0.3
[Ch][Tetradec]	0.49 ± 0.01	19.8 ± 0.2	0.92 ± 0.06	79 ± 6	8.4 ± 0.2	18 ± 1
$[N_{1,1,12,(C7H7)}]Br$	0.64 ± 0.01	25.4 ± 0.1	0.935 ± 0.002	66.1 ± 0.2	8.13 ± 0.01	10.5 ± 0.2

Note: It should be taken into account that the partition coefficient is highly influenced by the volume of each phase, which in AMTPS is considerable.

Table S31. Influence of plasma, serum and a mixture of plasma:serum (50:50, w:w) on the PF_{IgG} in the surfactant-poor phase and on the PF_{HSA} in the surfactant-rich phase, and on the IgG and HSA yield, with the respective standard deviation (σ). Partition coefficient (K) is also shown.

AMTPS	$IgG_{surfactant\text{-}rich\ phase}$		$HSA_{surfactant\text{-}poor\ phase}$		K	
	PF + σ	(Yield + σ)/%	PF + σ	(Yield + σ)/%	IgG	HSA
Plasma #2	0.489 ± 0.003	24.0 ± 0.1	0.924 ± 0.002	73 ± 5	8.2 ± 0.2	11.2 ± 0.3
Serum	0.53 ± 0.01	40 ± 1	0.95 ± 0.03	71 ± 4	5.0 ± 0.3	6.2 ± 0.7
Mixture 50/50 w/w	0.57 ± 0.01	34.2 ± 0.5	0.88 ± 0.01	72 ± 5	5.7 ± 0.4	7.8 ±0.2

Note: It should be taken into account that the partition coefficient is highly influenced by the volume of each phase, which in AMTPS is considerable.

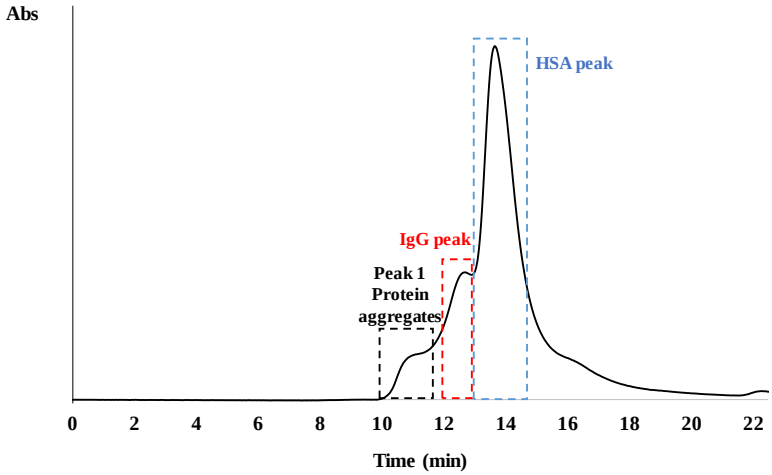

Figure S1. SE-HPLC chromatograms at 280 nm of human serum. HSA peak is shown in the blue rectangle whereas IgG peak is displayed in red. Protein aggregates are also present as the black rectangle indicates.

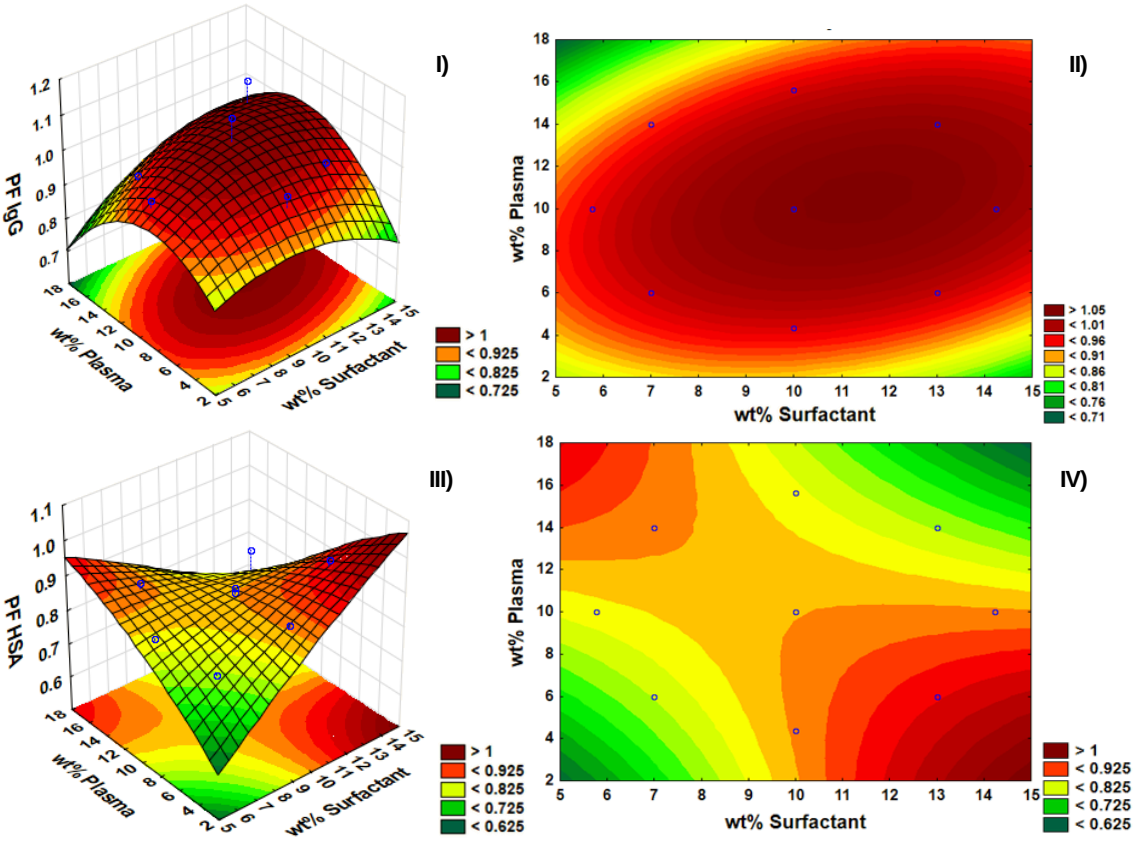

Figure S2. Response surface plots (left) and contour plots (right) of the PF_{IgG} in the surfactant-rich phase (**I** and **II**) and the PF_{HSA} in the surfactant-poor phase (**III** and **IV**) in the Triton X-114-based AMTPS. Data collected using plasma from donor #1.

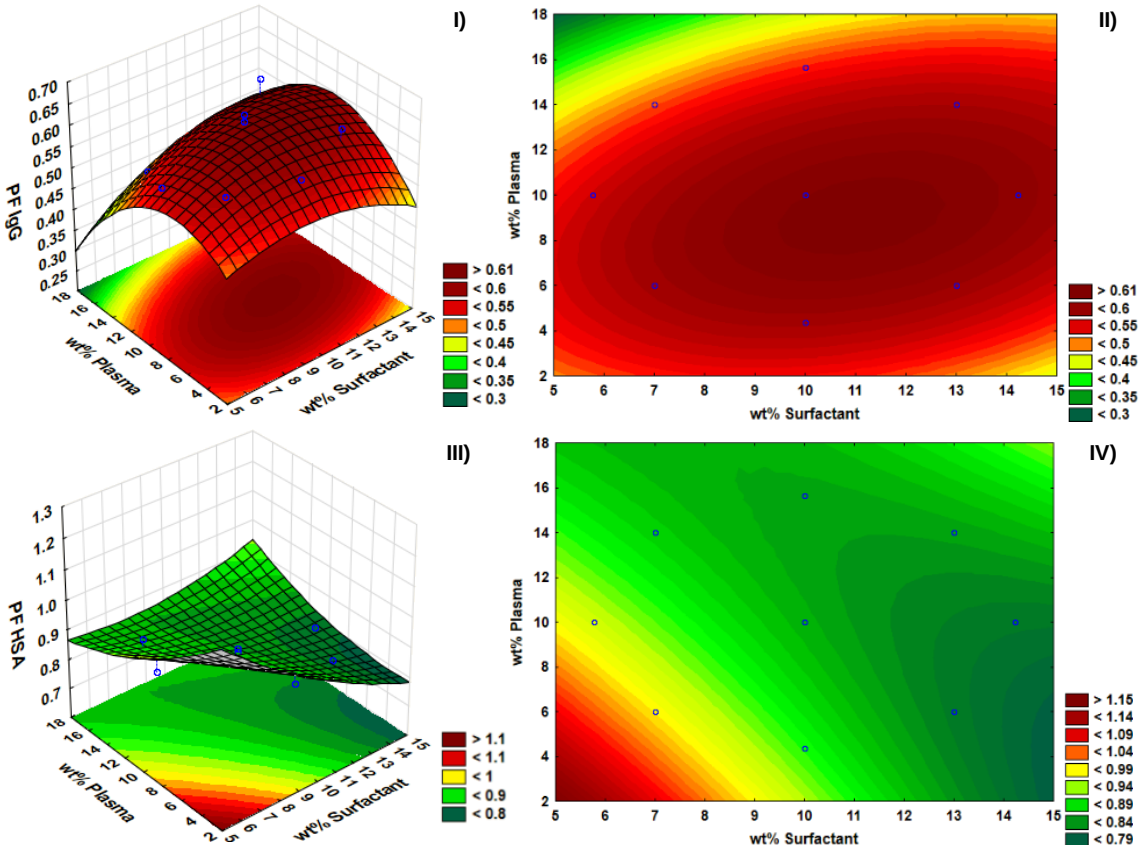

Figure S3. Response surface plots (left) and contour plots (right) of the PF_{IgG} in the surfactant-rich phase (**I** and **II**) and the PF_{HSA} in the surfactant-poor phase (**III** and **IV**) in the Tergitol 15-S-7-based AMTPS. Data collected using plasma from donor #1.

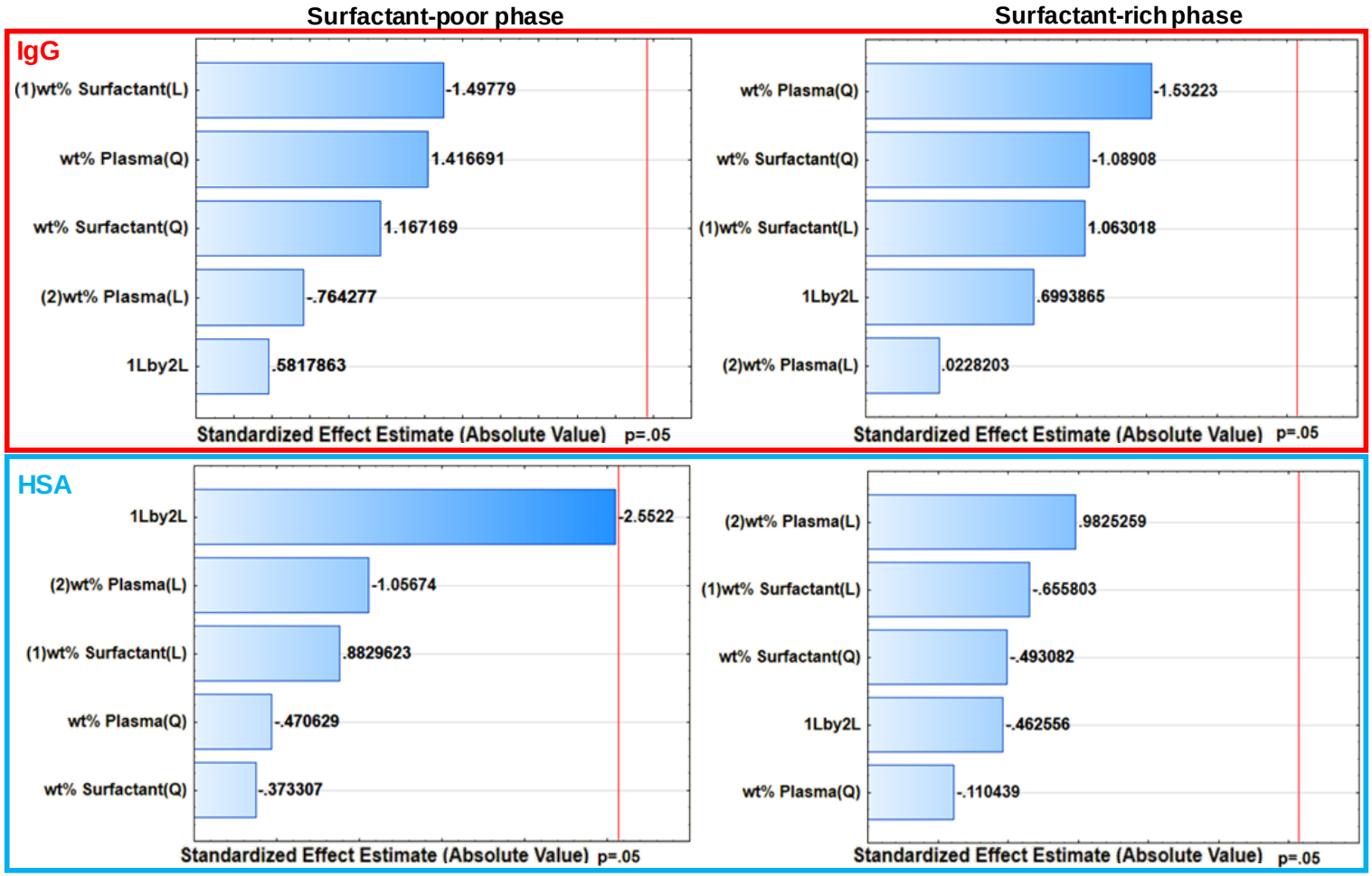

Figure S4. Pareto chart for Triton X-114 of the standardized effects using a 2^2 factorial design, being PF_{IgG} and PF_{HSA} in the surfactant-poor and -rich phases the response variables and the surfactant and plasma concentrations (wt%), the independent variables. Data collected using plasma from donor #1.

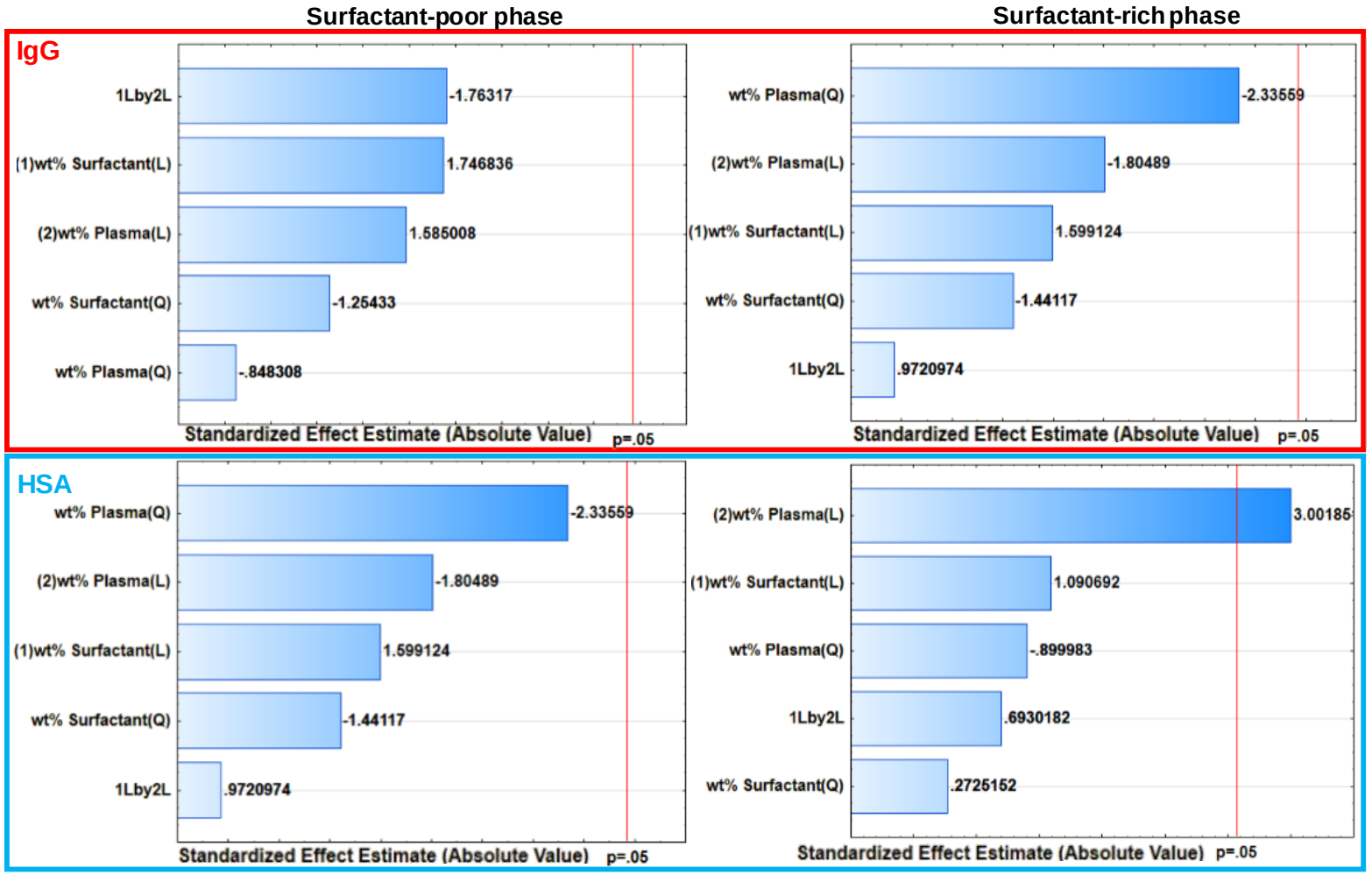

Figure S5. Pareto chart for Tergitol 15-S-7 of the standardized effects using a 2^2 factorial design, being PF_{IgG} and PF_{HSA} in the surfactant-poor and -rich phases the response variables and the surfactant and plasma concentrations (wt%), the independent variables. Data collected using plasma from donor #1.

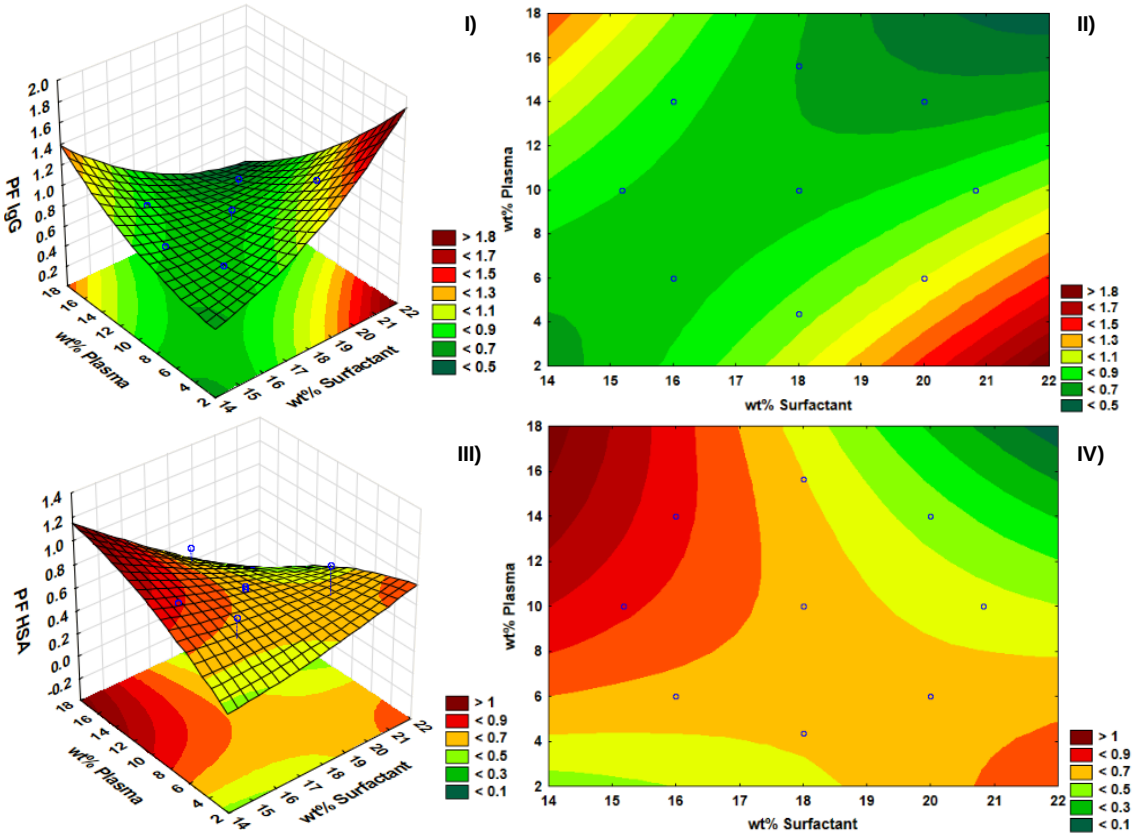

Figure S6. Response surface plots (left) and contour plots (right) of the PF_{IgG} in the surfactant-rich phase (**I** and **II**) and the PF_{HSA} in the surfactant-poor phase (**III** and **IV**) for the second 2^2 factorial planning with the Tergitol 15-S-7-based AMTPS. Data collected using plasma from donor #1.

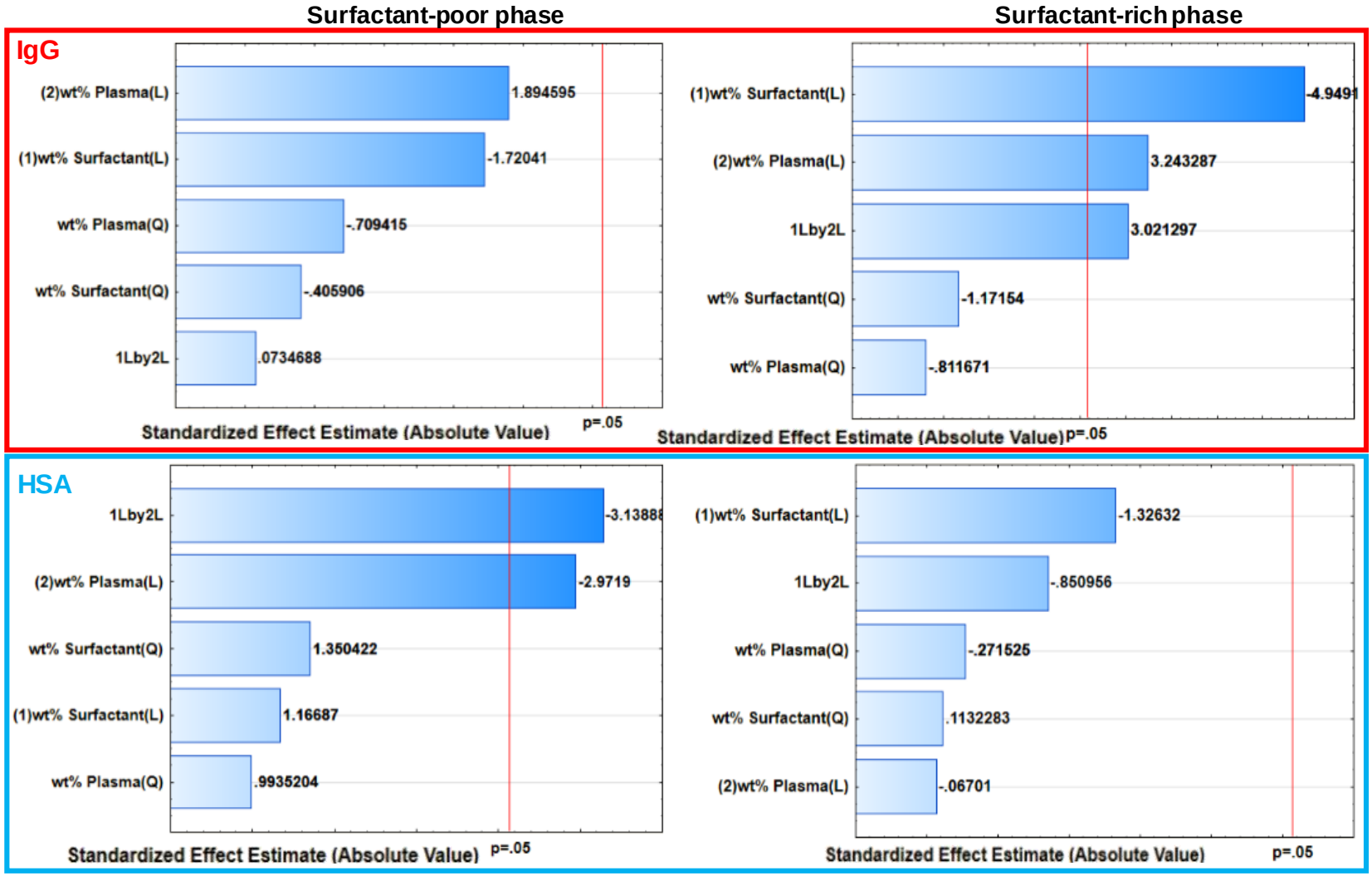

Figure S7. Pareto chart for Tergitol 15-S-7 of the standardized effects using a second 2^2 factorial design, being PF_{IgG} and PF_{HSA} in the surfactant-poor and -rich phases the response variables and the surfactant and plasma concentrations (wt%), the independent variable. Data collected using plasma from donor #1.

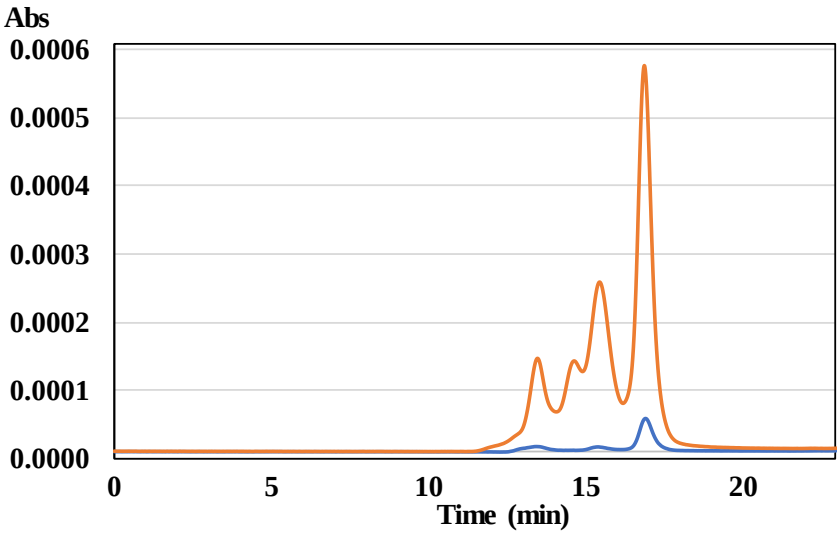

Figure S8. Chromatograms of the surfactant-poor phase (orange) and of the surfactant-rich phase (blue) using the mixed AMTPS composed of 15.2 wt% of Tergitol 15-S-7 + 0.3 wt% of $[P_{4,4,4,14}]Cl$ + 10 wt% of plasma + 74.5 wt% McIlvaine buffer pH 8.0.