Supporting Information

for

Hygroscopicity of Fresh and Aged Salt Mixtures from Saline Lakes

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Table S1. Molar concentration (mol/l) of all samples.

No.	Type	Na^+	K^+	Mg^{2+}	Ca^{2+}	Cl^-	SO_4^{2-}	NO_3^-	NH_4^+	References
1[a]	Aerosol	8.70E-12	-	8.33E-13	1.00E-11	3.94E-11	5.00E-11	2.26E-10	3.22E-10	From [16]
2[a]		1.30E-11	1.03E-11	8.33E-12	2.50E-11	8.45E-12	5.63E-11	1.56E-10	2.11E-10	
3[a]		8.70E-12	1.28E-11	3.33E-12	1.25E-12	8.45E-12	5.00E-11	8.39E-11	1.39E-10	
4[b]	Brine	3.8430	0.0826	0.0189	0.2425	4.3913	0.1726	-	-	From [42]
5[b]		4.5613	0.0890	0.5379	0.0108	5.1048	0.3078	-	-	
6[b]		1.1883	0.0064	0.1742	0.0078	1.2749	0.1364	-	-	
7[b]		3.4883	0.1146	1.1046	0.0030	5.2876	0.2461	-	-	
8[b]		0.1717	0.0038	0.0004	0.0213	0.1687	0.0243	-	-	
9[b]		0.4209	0.0115	0.0575	0.0003	0.3856	0.0645	-	-	
10[c]	Brine	0.7435	0.5077	3.1750	0.0075	7.2592	0.0635	-	-	From [43, 44]
11[c]		1.7217	0.5410	2.1708	0.0125	6.2423	0.0750	-	-	
12[c]		1.6130	0.2949	2.3292	0.0100	6.1972	0.0979	-	-	
13[c]		0.5609	0.4179	3.0792	0.0150	7.0592	0.0406	-	-	
14[c]		1.1391	0.2103	2.6583	0.0200	6.5972	0.0396	-	-	
15[c]		1.4913	0.5385	2.1542	0.0250	6.2930	0.0385	-	-	
16[c]		0.2522	0.1846	3.7042	0.0225	7.8282	0.0156	-	-	
17[c]		0.2478	0.1231	3.8500	0.0375	8.0901	0.0115	-	-	
18[c]		1.8652	0.1308	1.9292	0.0275	5.7887	0.0510	-	-	
19[c]		2.2435	0.7718	1.5250	0.0400	6.0535	0.0365	-	-	
20[c]		1.1652	0.2282	2.5208	0.1200	6.6282	0.0115	-	-	
21[c]		0.6391	0.1359	2.7958	0.3825	7.1155	0.0021	-	-	
22[c]		1.2391	0.1308	2.2125	0.3350	6.4507	0.0031	-	-	
23[c]		2.0217	0.0769	1.6250	0.3025	5.9324	0.0042	-	-	
24[c]		1.9913	0.0795	1.6542	0.3075	5.9718	0.0042	-	-	
25[c]		0.6130	0.1795	2.9875	0.1800	7.0958	0.0063	-	-	
26[c]		1.1522	0.1154	2.3708	0.2675	6.5155	0.0042	-	-	
27[c]		0.7348	0.1359	2.8000	0.2425	6.9268	0.0031	-	-	
28[c]		1.3348	0.2667	2.2208	0.1850	6.3803	0.0073	-	-	
29[c]		1.9522	0.0923	1.8042	0.1925	6.0141	0.0063	-	-	
30[c]		0.4652	0.2282	3.1208	0.2300	7.3493	0.0031	-	-	
31[c]		0.1217	0.0359	4.0500	0.3650	8.9183	0.0021	-	-	
32[c]		0.2348	0.0641	3.8208	0.0750	8.0451	0.0083	-	-	
33[c]		1.3217	0.1333	2.1750	0.2850	6.3437	0.0031	-	-	
34[c]		3.1043	0.0718	1.0750	0.1700	5.6366	0.0094	-	-	
35[c]		3.5174	0.0410	0.8792	0.1550	5.5972	0.0104	-	-	
36[c]		2.1261	0.1179	1.7750	0.2050	6.0394	0.0083	-	-	
37[c]		1.0174	0.0154	1.5000	0.1350	4.1549	0.0167	-	-	
38[c]		1.1391	0.5462	2.5167	0.0950	6.7042	0.0146	-	-	
39[c]		3.5000	0.0410	0.8833	0.1525	5.5831	0.0104	-	-	
40[c]		3.6696	0.0462	0.7750	0.1700	5.5831	0.0094	-	-	
41[c]		3.6130	0.0487	0.7083	0.2650	5.5859	0.0063	-	-	
42[c]		3.8957	0.0385	0.6292	0.2050	5.5831	0.0073	-	-	
43[c]		3.1739	0.0333	0.9167	0.3650	5.7352	0.0083	-	-	
44[c]		0.0522	0.0179	4.3875	0.6475	10.0986	0.0021	-	-	

45[c]		1.5522	0.1000	1.7292	0.5725	6.2254	0.0042	-	-	
46[d]	Brine	3.4261	0.0756	0.8063	0.0450	4.5262	0.3360	-	-	From [45]
47[d]		3.8783	0.0705	0.8667	0.0263	5.1276	0.3719	-	-	
48[d]		3.7522	0.0769	1.0438	0.0213	5.1206	0.5094	-	-	
49[d]		3.5543	0.0846	1.1375	0.0188	5.4217	0.5278	-	-	
50[d]		2.4174	0.1692	2.2938	0.0213	5.5780	1.0552	-	-	
51[d]		1.0022	0.2731	2.8396	0.0363	5.8113	0.8011	-	-	
52[d]		0.2217	0.1872	3.8313	0.0000	6.5392	0.4346	-	-	
53[d]		0.0783	0.0269	4.7667	0.0000	8.1668	0.3945	-	-	
54[d]		0.0500	0.0167	4.9188	0.0600	8.6287	0.2740	-	-	
55[d]		0.0457	0.0128	4.8771	0.0613	8.7611	0.2922	-	-	
56[d]		0.0478	0.0141	4.6500	0.0563	8.3594	0.2646	-	-	
57[d]		2.9257	0.1677	1.7238	0.0043	5.2473	0.4856	-	-	
58[d]		2.4122	0.1805	2.2342	0.0035	5.4304	0.5092	-	-	
59[e]		1.8048	0.1964	2.5263	0.0033	5.6955	0.5492	-	-	
60[d]		1.6778	0.2056	2.6396	0.0030	5.8679	0.5202	-	-	
61[d]		0.8652	0.2379	3.2013	0.0028	6.0685	0.4972	-	-	
62[d]		1.2065	0.2541	3.1154	0.0028	6.3530	0.4568	-	-	
63[d]		0.3083	0.0495	4.7129	0.0010	8.6800	0.3291	-	-	
64[d]		0.8087	0.0585	3.7167	0.0018	7.5406	0.3520	-	-	
65[d]		0.2022	0.0215	4.7233	0.0008	9.2707	0.3006	-	-	
66[e]	Brine	3.4804	0.1185	1.1413	0.0058	5.2823	0.2441	-	-	From [46]
67[e]		3.4591	0.1172	1.1396	0.0043	5.2490	0.2373	-	-	
68[e]		2.7022	0.1133	1.0504	0.0028	4.6515	0.1920	-	-	
69[e]		0.8761	0.0315	0.4508	0.0020	1.5321	0.1495	-	-	
70[f]	Aerosol	1.01E-04	1.79E-06	4.58E-06	5.43E-05	8.45E-05	6.36E-05	-	-	From [47]
71[f]		2.09E-05	1.03E-06	8.33E-07	5.50E-06	1.58E-05	7.19E-06	-	-	
72[f]		2.87E-05	7.69E-07	8.33E-07	4.75E-06	2.39E-05	6.56E-06	-	-	
73[f]		3.39E-05	1.03E-06	1.25E-06	3.75E-06	2.39E-05	7.50E-06	-	-	
74[f]		3.17E-05	1.28E-06	8.33E-07	7.00E-06	1.55E-05	1.40E-05	-	-	
75[f]		2.17E-05	3.59E-06	8.33E-07	3.75E-06	1.89E-05	5.83E-06	-	-	
76[f]		1.07E-04	3.59E-06	2.50E-06	2.50E-05	8.25E-05	3.98E-05	-	-	
77[f]		1.02E-04	1.54E-06	1.67E-06	3.53E-05	3.75E-05	6.70E-05	-	-	
78[f]		1.28E-04	2.31E-06	5.42E-06	4.20E-05	6.68E-05	7.61E-05	-	-	
79[f]		5.39E-05	2.05E-06	1.25E-06	8.25E-06	1.21E-05	2.83E-05	-	-	
80[f]		3.26E-05	2.05E-06	2.92E-06	2.78E-05	2.59E-05	3.31E-05	-	-	
81[f]		8.70E-06	7.69E-07	1.25E-06	5.75E-06	5.92E-06	6.77E-06	-	-	
82[f]		1.74E-06	5.13E-07	8.33E-07	3.25E-06	1.13E-06	2.60E-06	-	-	
83[f]		6.52E-06	7.69E-07	1.25E-06	1.35E-05	3.66E-06	1.46E-05	-	-	
84[f]		1.09E-05	5.13E-07	1.25E-06	3.50E-06	6.20E-06	5.73E-06	-	-	
85[f]		2.83E-05	7.69E-07	2.08E-06	5.00E-06	2.90E-05	5.52E-06	-	-	
86[f]		1.17E-05	7.69E-07	8.33E-07	5.50E-06	7.89E-06	7.40E-06	-	-	
87[f]		6.96E-06	5.13E-07	1.25E-06	9.75E-06	5.07E-06	1.03E-05	-	-	
88[f]		6.09E-06	5.13E-07	8.33E-07	1.25E-06	3.10E-06	1.15E-06	-	-	
89[f]		-	5.13E-07	4.17E-07	1.00E-06	5.63E-07	-	-	-	
90[g]	Brine	0.0058	0.0006	0.0009	0.0009	0.0062	0.0009	-	-	

91g	0.0031	0.0000	0.0009	0.0011	0.0026	0.0009	-	-	
92g	0.0074	0.0002	0.0013	0.0009	0.0032	0.0012	-	-	
93g	0.0060	0.0002	0.0017	0.0010	0.0048	0.0010	-	-	
94g	1.2070	0.0070	0.1370	0.0720	1.5800	0.0260	-	-	
95g	1.1670	0.0040	0.1290	0.0810	1.5180	0.0360	-	-	
96g	1.1310	0.0040	0.1310	0.0400	1.4640	0.0070	-	-	
97g	0.0820	0.0006	4.5300	1.5100	12.0200	0.0002	-	-	
98g	0.7820	0.2220	2.9900	0.4950	7.9890	0.0023	-	-	
99g	4.0820	0.0850	0.9810	0.1040	6.3020	0.0182	-	-	
100g	4.5880	0.0140	0.4570	0.2770	6.0590	0.0063	-	-	
101g	0.8720	0.5540	3.3870	0.0097	7.7270	0.1150	-	-	
102g	2.1200	0.3650	1.9100	0.0192	6.1580	0.0870	-	-	From [47, 48]
103g	0.0410	0.0210	5.7550	0.0025	11.4000	0.0806	-	-	
104g	2.0510	0.5490	2.1560	0.0620	6.9790	0.0273	-	-	
105g	1.2190	0.5240	3.1310	0.0230	7.7000	0.1760	-	-	
106g	0.2640	0.1570	4.7310	0.0020	9.4920	0.1970	-	-	
107g	0.8320	0.4710	3.3920	0.0210	7.5920	0.0550	-	-	
108g	0.8970	0.4860	3.2370	0.0210	7.5940	0.0510	-	-	
109g	0.8830	0.4620	3.2570	0.0220	7.4710	0.0600	-	-	
110g	4.6280	0.2090	0.5650	0.0077	6.0060	0.2650	-	-	
111g	4.0620	0.2470	1.4520	0.0288	5.7030	0.7490	-	-	
112g	0.5440	0.5530	3.8340	0.0024	8.4490	0.1470	-	-	
113g	0.2880	0.2110	4.6320	0.0000	8.8010	0.4690	-	-	

Table S2. DRH predicted by the AIOMFAC model.

Site	Type	No.	NaCl	$MgCl_2$	$MgSO_4$	KCl	NH_4NO_3	$(NH_4)_2SO_4$
Xiao Chi	Brine	XC	69.17	7.8	73.36	7.8	-	-
Yan Chi		YC	66.47	25.75	81.75	32.57	-	-
Chaka		CK	70.38	30.7	66	44.71	-	-
KeKe		KK	71.83	26.16	71.83	36.17	-	-
Qarhan		QH	42.42	37.52	66.09	44.71	-	-
Mang'ai		MA	63.45	32.95	77.32	51.1	-	-
pre-dust event	Aerosol	1a	-	-	71.03	-	34.03	77.1
dust event		2a	0.09	-	84.32	0.09	39.27	82.65
post-dust event		3a	-	-	71.36	-	23.85	69.86
Lake Dachaidan	Brine	4b	72.11	10.39	68.42	35.88	-	-
Lake Xiaochaidan		5b	72.86	27.19	58.84	36.52	-	-
Lake Gahai-1		6b	72	23.68	67.91	2.8	-	-
Lake Chaka		7b	71.76	30.11	62.87	44.1	-	-
Lake Qinghai		8b	66.34	0.33	73.88	25.79	-	-
Lake Gahai		9b	72.62	25.49	65.94	41.79	-	-
Bieletan	Brine	10c	55.08	35.41	58.36	61.31	-	-
Dabuxun		18c	66.95	33.63	59.12	48.3	-	-
Qarhan		30c	50.58	37.08	57.61	54.27	-	-
Huobuxun		37c	63.93	35.24	68.48	26.81	-	-
Gasikule Salt Lake-1	Brine	51d	56.67	32.26	82.02	52.76	-	-
Gasikule Salt Lake-2		62d	58.31	33.48	76.06	54.79	-	-
KeKe	Brine	67e	71.67	29.88	62.74	43.89	-	-
Inner Mongolia-1	Aerosol	74f	45.08	0.02	82.69	23.21	-	-
Inner Mongolia-2		84f	45.16	0.34	89.29	24.22	-	-
Qaidam River	Brine	91g	51.64	3.63	91.17	15.27	-	-
Golmud River		92g	56.54	1.85	86.5	25.47	-	-
Karst Spring		94g	72.12	24.48	73.7	21.26	-	-
North Huobusun		99g	71.86	30.83	54.51	39.21	-	-
Dabusun		109g	55.02	35.33	58.31	61.27	-	-
Senie		110g	72.43	26.71	58.3	48.76	-	-
Dabiele		111g	70.26	26.19	74.02	49.43	-	-
Xiaobiele		112g	47.64	35.68	64.21	61.56	-	-
Tuanjie		113g	42.18	37.09	75.04	48.99	-	-

Table S3. Correlations of the DRH and ions in brine samples.

	Na^+	**K^+**	**Mg^{2+}**	**Ca^{2+}**	**Cl^-**	**SO_4^{2-}**
NaCl	0.65	-0.48	-0.76	0.00	-0.44	0.07
$MgCl_2$	0.13	0.56	0.74	0.04	0.81	0.26
$MgSO_4$	-0.42	-0.35	-0.21	-0.23	-0.52	0.28
KCl	0.15	0.81	0.74	0.02	0.81	0.30

Table S4. Correlations of the DRH value of four kinds of salts in brine samples.

	NaCl	$MgCl_2$	$MgSO_4$	KCl
NaCl	1.00			
$MgCl_2$	-0.25	1.00		
$MgSO_4$	-0.20	-0.53	1.00	
KCl	-0.36	0.69	-0.41	1.00

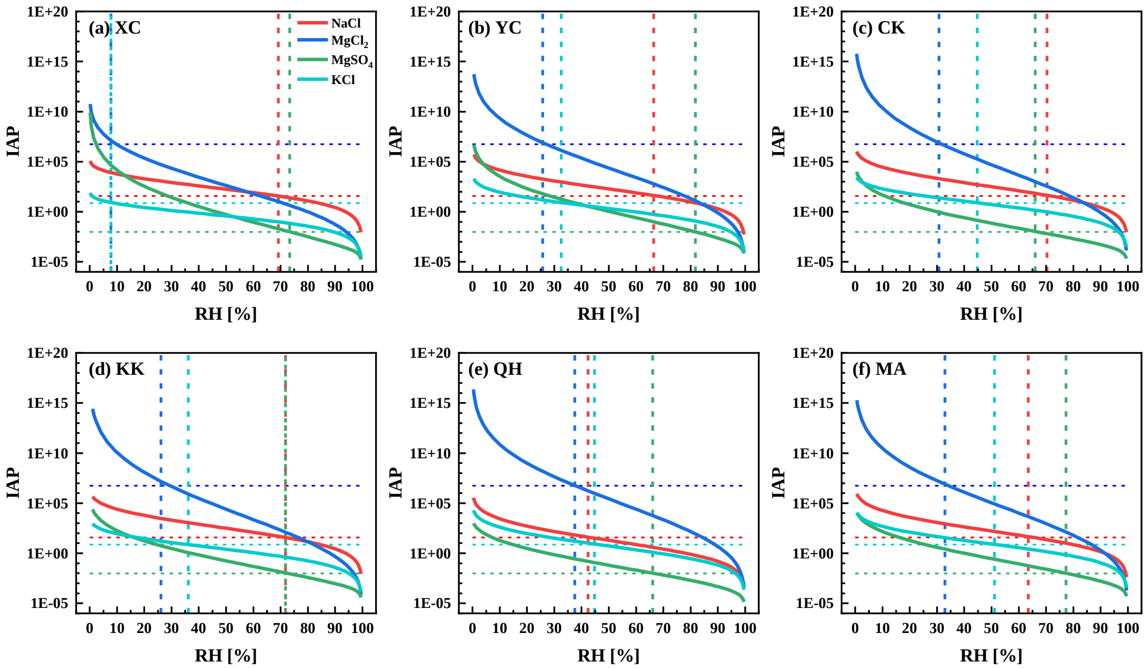

Figure S1a. AIOMFAC modelled IAPs as a function of RH (brine samples from Shan'xi and Qinghai). The horizontal dashed lines are DRH for individual salts in the corresponding salt mixture. The vertical dashed lines are the DRH found by the AIOMFAC model.

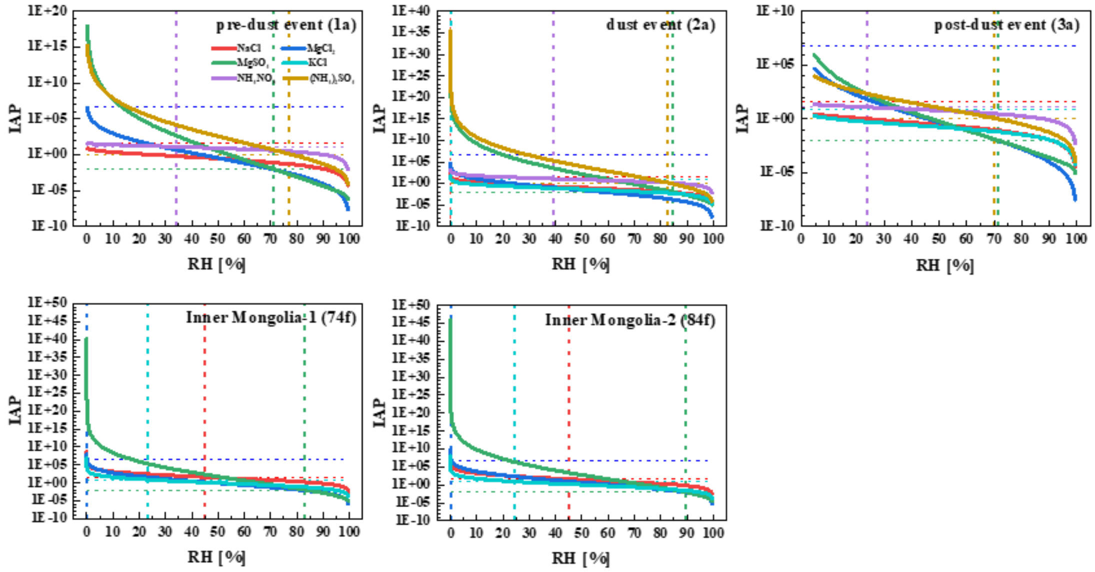

Figure S1b. AIOMFAC modelled IAP as a function of RH (aerosol samples). The horizontal dashed lines are DRH for individual salts in the corresponding salt mixture. The vertical dashed lines are the DRH found by the AIOMFAC model.

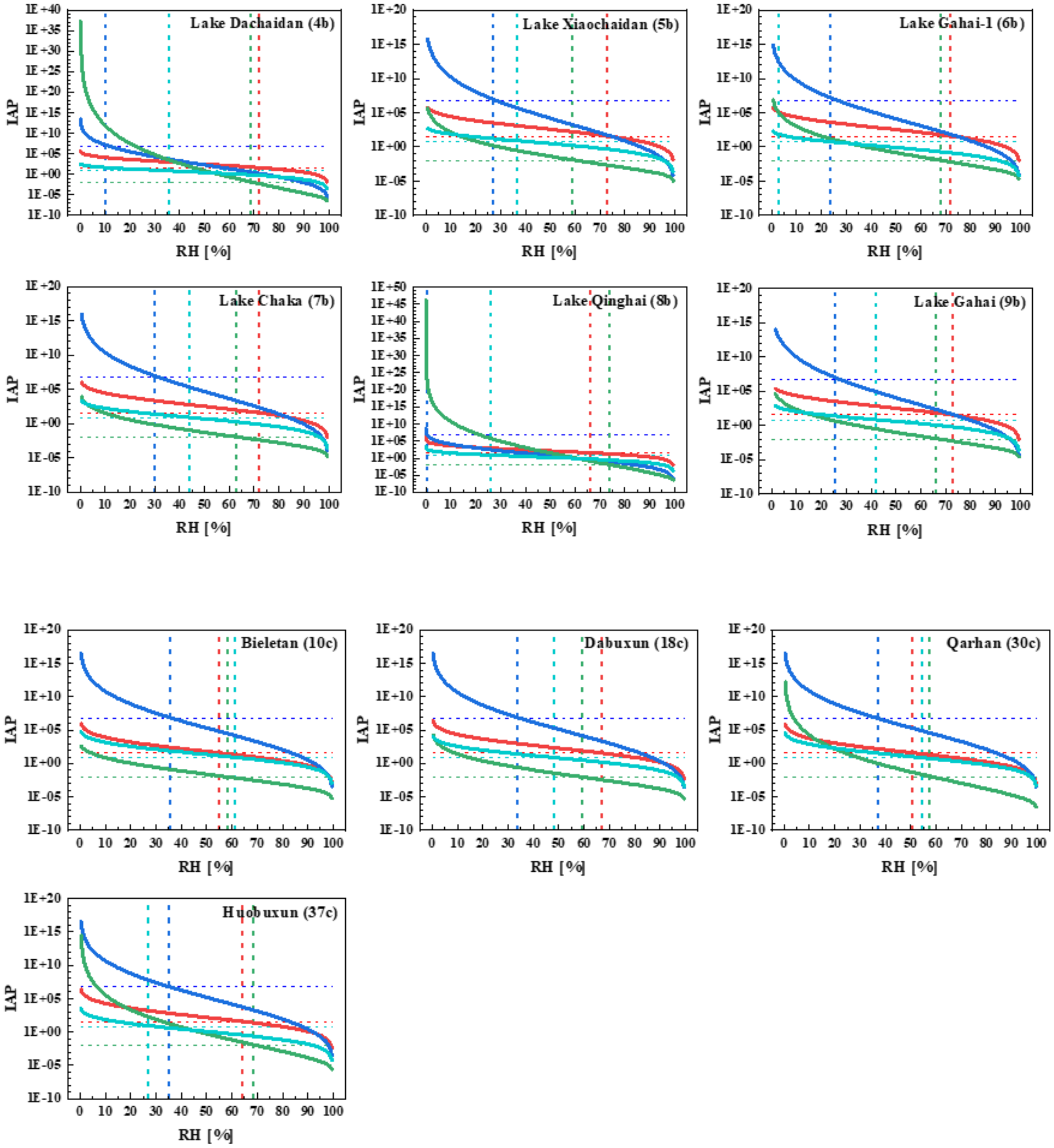

Figure S1c. AIOMFAC modelled IAP as a function of RH (brine samples). The horizontal dashed lines are DRH for individual salts in the corresponding salt mixture. The vertical dashed lines are the DRH found by the AIOMFAC model.

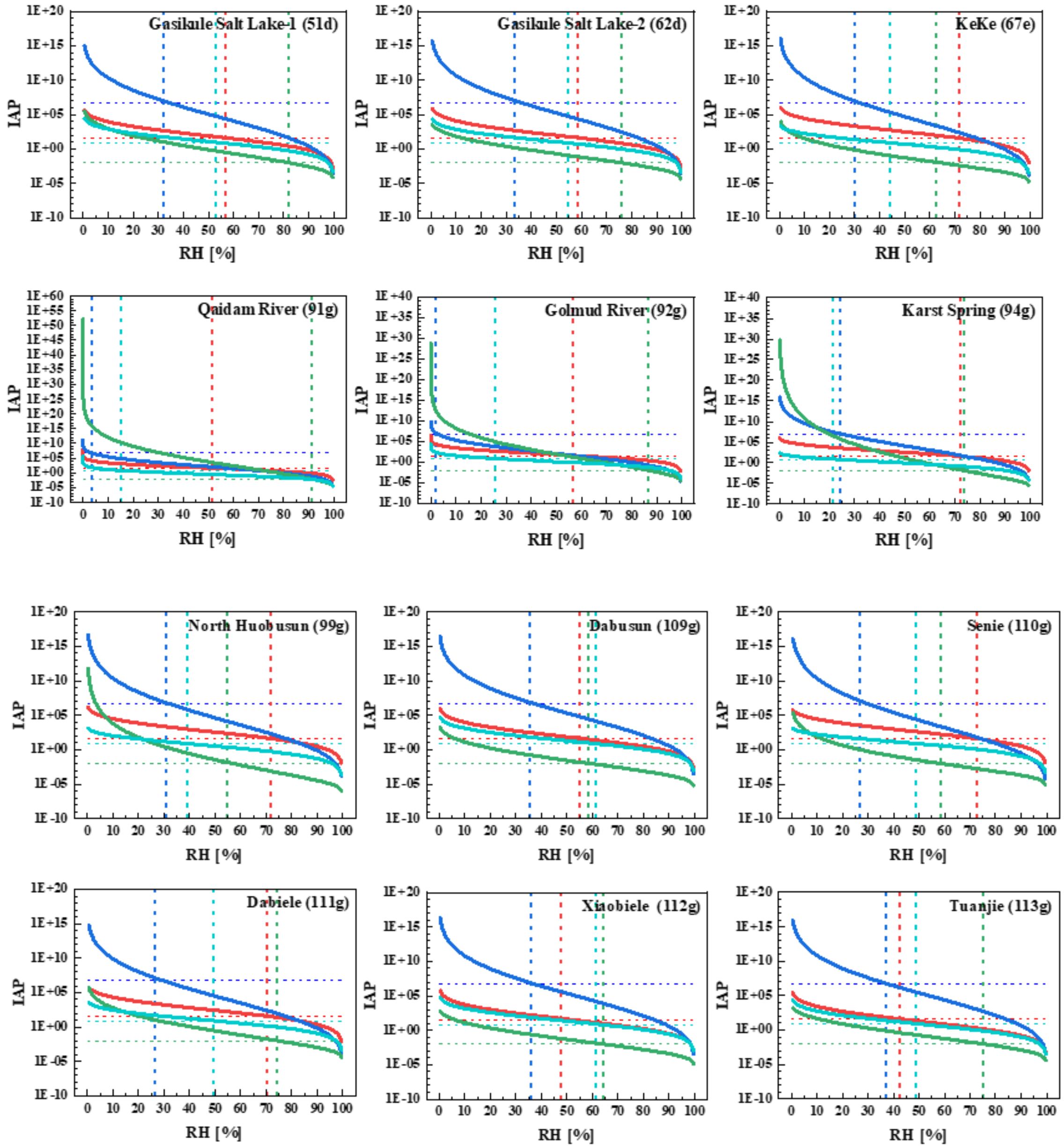

Figure S1d. AIOMFAC modelled IAP as a function of RH (brine samples). The horizontal dashed lines are DRH for individual salts in the corresponding salt mixture. The vertical dashed lines are the DRH found by the AIOMFAC model.