Dataset S1. The results from individual contact efflorescence experiments.

Droplet	CN	Trial Number[a]	Droplet Number[b]	Outcome[c]	RH (%)
$(NH_4)_2SO_{4(aq)}$	$(NH_4)_2SO_4$	**1 (1.5 µm CN)[d]**	**1**	**Single-collision CE**	**78.4±1.0[e,f]**
		2	**1**	**Single-collision CE**	**78.7±2.5[e]**
		3	**1**	**Single-collision CE**	**79.3±1.0[e]**
		4	**1**	**Single-collision CE**	**79.2±1.7[e]**
		5	**1**	**Single-collision CE**	**79.0±1.2[e]**
		Average CERH[g]			**79±2**
$(NH_4)_2SO_{4(aq)}$	K_2SO_4	1	1	Single-collision CE	56.3±3.3[h]
			2	Single-collision CE	62.2±2.9
			3	Single-collision CE	63.6±1.0
			4	Single-collision CE	65.4±1.0
			5	Single-collision CE	67.6±1.0
			6	Single-collision CE	69.6±1.2
			7	**Single-collision CE**	**77.6±2.6[e,h]**
		2	**1**	**Single-collision CE**	**77.3±2.3[e,h]**
		Average CERH[g]			**77±3**
$(NH_4)_2SO_{4(aq)}$	NaCl	1 (0.5 µm CN)[d]	1	Collision, no CE	44.1±1.1
			2	Collision, no CE	40.3±2.0
			3	**Single-collision CE**	**37.9±2.8**
		2 (1 µm CN)[d]	1	Collision, no CE	45.2±1.0
			2	Collision, no CE	39.7±1.0
			3	**Single-collision CE**	**37.6±1.0**
		3	1	Collision, no CE	44.7±4.2
			2	Collision, no CE	41.2±2.5
			3	Homogeneous eff	37.1±1.1
			4	**Single-collision CE**	**38.2±1.0**
		4	1	Collision, no CE	39.5±1.1
			2	**Single-collision CE**	**38.4±1.2**
		Average CERH[g]			**38±2**
$(NH_4)_2SO_{4(aq)}$	Na_2SO_4	1	1	Collision, no CE	58.3±4.2
			2	Collision, no CE	47.3±3.1
			3	**Single-collision CE**	**43.5±2.2**
		2	1	Collision, no CE	49.1±1.0
			2	Collision, no CE	45.3±2.0
			3	**Single-collision CE**	**42.3±2.9**
		3	1	Multiple-collision CE	44.8±2.2
			2	**Single-collision CE**	**43.0±1.9**
		Average CERH[g]			**43±3**
$(NH_4)_2SO_{4(aq)}$	NaBr	1	1	Collision, no CE	45.5±1.4
			2	Collision, no CE	39.9±1.0
			3	Homogeneous eff	36.6±1.0
			4	**Single-collision CE**	**37.4±0.6**
		2	1	Multiple-collision CE[e]	38.2±1.0
			2	Homogeneous eff	36.7±1.0
			3	**Single-collision CE**	**36.9±1.0**
		3	1	Multiple-collision CE	37.7±1.0
			2	Homogeneous eff	36.4±1.0
			3	Homogeneous eff	37.2±1.0
			4	**Single-collision CE**	**37.0±1.0**

		Average CERH[g]			**37±1**
$(NH_4)_2SO_{4(aq)}$	KCl	1	1	Collision, no CE	54.3±2.0
			2	Collision, no CE	46.3±3.0
			3	**Single-collision CE**	**43.1±1.8**
		2	1	Collision, no CE	51.7±1.0
			2	Multiple-collision CE	45.2±1.0
			3	**Single-collision CE**	**42.1±1.6**
		3	1	Multiple-collision CE	43.5±1.3
			2	**Single-collision CE**	**41.6**±1.0
		Average CERH[g]			**42±2**
$NH_4NO_{3(aq)}$	K_2SO_4	1	1	Single-collision CE	46.4±1.3
			2	Multiple-collision CE (9)	52.2±1.0
			3	**Single-collision CE**	**49.8±1.5**
		2	1	Multiple-collision CE (26)	52.7±1.2
			2	Multiple-collision CE (2)	49.6±1.0
			3	**Single-collision CE**	**49.1±1.2**
		3	1	Multiple-collision CE (15)	51.4±1.0
			2	Single-collision CE	48.3±1.2
			3	**Single-collision CE**	**49.9±1.3**
		4	1	Multiple-collision CE (4)	50.6±1.2
			2	**Single-collision CE**	**49.5±1.1**
		Average CERH[g]			**50±2**
$NH_4NO_{3(aq)}$	NaCl	1	1	Collision, no CE	56.5±2.3
			2	Collision, no CE	51.6±1.9
			3	Multiple-collision CE	49.5±1.5
			4	Single-collision CE	39.9±3.5
			5	**Single-collision CE**	**45.4±0.5**
		2	1	Collision, no CE	51.4±1.6
			2	Multiple-collision CE	48.5±0.5
			3	**Single-collision CE**	**46.4±1.6**
		3	1	Collision, no CE	50.6±0.5
			2	**Single-collision CE**	**46.7±0.5**
		Average CERH[g]			**46±2**
$NH_4NO_{3(aq)}$	Na_2SO_4	1	1	Collision, no CE	39.4±1.1
			2	Collision, no CE	26.9±1.1
			3	Multiple-collision CE (4)	21.6±1.2
			4	**Single-collision CE**	**19.6±1.0**
		2	1	Multiple-collision CE (11)	24.2±0.5
			2	Multiple-collision CE (5)	22.8±1.3
			3	Multiple-collision CE (3)	21.2±2.0
			4	**Single-collision CE**	**20.6±2.5**
		3	1	Multiple-collision CE (43)	25.6±1.1
			2	Multiple-collision CE (8)	23.5±2.0
			3	Multiple-collision CE (2)	21.5±1.0
			4	**Single-collision CE**	**20.1±1.6**
		4	1	Multiple-collision CE (6)	22.9±1.7
			2	Multiple-collision CE (2)	22.6±0.8
			3	Multiple-collision CE (3)	22.0±1.0
			4	**Single-collision CE**	**21.0±1.0**
		Average CERH[g]			**20±2**

$NH_4NO_{3(aq)}$	NaBr	1	1	Collision, no CE	50.6±2.9
			2	Single-collision CE	42.7±2.6
			3	**Single-collision CE**	**44.9±1.8**
		2	1	Multiple CE	48.4±1.0
			2	**Single-collision CE**	**44.8±2.0**
		3	1	Multiple-collision CE	47.2±1.5
			2	Multiple-collision CE	45.5±1.5
			3	**Single-collision CE**	**44.9±1.7**
		Average CERH[g]			**45±2**
$NH_4NO_{3(aq)}$	KCl	1	1	Collision, no CE	55.3±3.8
			2	Collision, no CE	28.0±2.6
			3	**Single-collision CE**	**21.4±3.0**
		2	1	Collision, no CE	30.4±1.5
			2	Multiple-collision CE	25.7±2.6
			3	**Single-collision CE**	**21.2±1.0**
		3	1	Collision, no CE	24.3±2.7
			2	**Single-collision CE**	**21.0±2.9**
		Average CERH[g]			**21±3**
$NH_4NO_{3(aq)}$	$(NH_4)_2SO_4$	1	1	Collision, no CE	53.4±1.5
			2	**Single-collision CE**	**45.9±3.0**
		2	1	Collision, no CE	51.7±1.6
			2	**Single-collision CE**	**47.2±1.4**
		3	1	Multiple-collision CE	49.2±1.0
			2	**Single-collision CE**	**46.5±1.0**
		Average CERH[g]			**47±3**
$NH_4NO_{3(aq)}$	NH_4NO_3-illite	1	1	Single-collision CE	57.5±2.5
			2	Single-collision CE	57.8±1.0
			3	Single-collision CE	57.6±1.0
			4	**Single-collision CE**	**58.8±1.0**
		2	1	Collision, no CE	60.6±1.4[i]
			2	**Single-collision CE**	**59.4±1.7**
		3	**1**	**Single-collision CE**	**58.7±1.4**
		Average CERH[g]			**59±2**
$NaCl_{(aq)}$	K_2SO_4	1	1	Collision, no CE	53.8±2.4
			2	**Single-collision CE**	**48.0±3.0**
		2	1	Collision, no CE	51.3±2.8
			2	**Single-collision CE**	**47.7±2.7**
		3	1	Collision, no CE	52.9±2.5
			2	Multiple-collision CE	50.5±1.2
			3	**Single-collision CE**	**48.5±2.0**
		Average CERH[g]			**48±3**
$NaCl_{(aq)}$	Na_2SO_4	1	1	Collision, no CE	57.8±1.0
			2	Collision, no CE	53.4±1.0
			3	Single-collision CE	49.9±1.2
			4	**Single-collision CE**	**51.6±1.2**
		2	1	Collision, no CE	54.6±1.0
			2	Multiple-collision CE	52.4±1.0
			3	**Single-collision CE**	**51.1±1.3**
		3	1	Multiple-collision CE	53.5±1.0
			2	Multiple-collision CE	52.5±1.0

			3	**Single-collision CE**	**52.0±1.2**
		4	1	Multiple-collision CE	53.6±1.4
			2	**Single-collision CE**	**52.1±1.0**
		Average CERH[g]			**52±2**
$NaCl_{(aq)}$	NaBr	1	1	Single-collision CE	45.8±2.9
			2	**Single-collision CE**	**49.7±2.0**
		2	1	Multiple-collision CE	51.2±1.6
			2	**Single-collision CE**	**50.4±1.4**
		3	1	Multiple-collision CE	52.9±1.5
			2	**Single-collision CE**	**51.3±1.3**
		4	1	Collision, no CE	53.0±2.1
			2	Multiple-collision CE	51.9±1.8
			3	Multiple-collision CE	50.9±1.8
			4	**Single-collision CE**	**49.3±2.0**
		5	1	Collision, no CE	50.3±2.0
			2	Multiple-collision CE	49.5±2.1
			3	**Single-collision CE**	**48.6±2.1**
		Average CERH[g]			**50±3**
$NaCl_{(aq)}$	KCl	1	1	Collision, no CE	73.9±1.0
			2	Single-collision CE	60.7±1.8
			3	**Single-collision CE**	**63.8±2.0**
		2	1	Collision, no CE	68.5±3.2
			2	Collision, no CE	65.6±2.8
			3	**Single-collision CE**	**63.7±3.0**
		3	1	Collision, no CE	65.8±1.9
			2	Single-collision CE	61.5±1.0
			3	**Single-collision CE**	**64.1±1.2**
		Average CERH[g]			**64±3**
$NaCl_{(aq)}$	$(NH_4)_2SO_4$	1	1	Collision, no CE	51.4±2.3
			2	Multiple-collision CE	48.5±2.1
			3	**Single-collision CE**	**47.1±1.9**
		2	1	Collision, no CE	50.5±1.0
			2	Multiple-collision CE	48.1±1.0
			3	**Single-collision CE**	**46.8±1.0**
		3	1	Collision, no CE	49.7±1.0
			2	**Single-collision CE**	**47.7±1.0**
		4	1	Multiple-collision CE	50.2±1.0
			2	Multiple-collision CE	48.4±1.0
			3	**Single-collision CE**	**47.2±1.0**
		Average CERH[g]			**47±2**
$NaCl_{(aq)}$	NaCl	1	1	Single-collision CE	59.3±4.4
			2	Single-collision CE	69.7±3.1
			3	Single-collision CE	71.3±2.9
			4	**Single-collision CE**	**74.1±2.6**
		2	1	Collision, no CE	74.8±2.5[i]
			2	**Single-collision CE**	**73.8±1.0**
		3	**1**	**Single-collision CE**	**73.6±1.0**
		Average CERH[g]			**74±2**

[a]Each **Trial** represents a series of individual experiments at varying ambient RH. The ambient RH was varied (by increasing or decreasing the RH) until the CERH was determined for that trial. (Recall, the CERH is the *maximum* RH at which efflorescence was induced upon a single collision.) A new trial was initiated by raising the ambient RH and repeating the process of varying ambient RH.

[b]Each individual experiment within a Trial was performed by trapping a fresh **Droplet** once the ambient RH was set.

[c]The possible outcomes for each experiment (i.e., each Droplet) were **Single-collision CE**, in which contact efflorescence was observed without any previous collisions; **Multiple-collision CE**, in which contact efflorescence was observed but one or more collisions were also observed prior to the collision that induced efflorescence; **Collision, no CE**, in which a CN-droplet collision was observed without efflorescence (note that in these instances, contact efflorescence may still be possible upon more collisions); and **Homogeneous eff**, in which efflorescence was not coincident with a collision and thus assumed to be a result of homogeneous nucleation of efflorescence. Post processing of recorded images was necessary to distinguish possible outcomes (*see main article, Materials and Methods - Monitoring Collisions*). For several instances of Multiple-collision CE, the total number of CN-droplet collisions preceding the one that induced efflorescence were determined from image post-processing and these values are given in parentheses.

[d]Diameter of CN size selected using a differential mobility analyzer (DMA).

[e]Value originally reported by Davis et al. (2015) Long working-distance optical trap for in situ analysis of contact-induced phase transformations. *Anal Chem* 87(12):6186-6194.[12] See reference for experiments performed at lower RH.

[f]The maximum achievable RH was experimentally limited while flowing CN (*see main article, Materials and Methods – RH Control and Measurement*).

[g]The Average CERH (plus/minus one standard deviation) was calculated from the highest RH values where Single-collision CE was observed during a Trial. The values used to calculate the average are highlighted in bold font.

[h]It was not initially anticipated that the $K_2SO_{4(CN)}$-$(NH_4)_2SO_{4(aq)}$ CERH would be as high as 77% RH. Thus, the initial trial began at a low RH (56%) and the CERH was determined by progressively increasing the RH. The two highest values were used to calculate the average CERH. No attempts were made to observe $K_2SO_{4(CN)}$-$(NH_4)_2SO_{4(aq)}$ contact efflorescence at a higher RH due to the experimental difficulty of increasing the RH further (*see main article, Materials and Methods – RH Control and Measurement*) and due to the fact that the observed CERH is just slightly below the thermodynamic limit for $(NH_4)_2SO_{4(aq)}$ efflorescence (80%, i.e., the $(NH_4)_2SO_4$ DRH).

[i]CN likely deliquesced in gas flow prior to CN-droplet collision.