nterpretation. The analyses were performed by A. A. Sirotenko of this Department. The platinum black catalyst was placed at our disposal by Baker and Co., Inc., Newark 5, N. J., and the nitroparaffins by Commercial Solvents Corp.

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[CONTRIBUTION FROM THE DEPARTMENT OF CHEMISTRY, UNIVERSITY OF NEW HAMPSHIRE]

The System Ammonium Fluoride–Sodium Fluoride–Water at 25°[1]

BY HELMUT M. HAENDLER AND AVIS CLOW

The system ammonium fluoride–sodium fluoride–water has been studied at 25°. The system is simple; the solid phases are ammonium fluoride and sodium fluoride. No hydrate of sodium fluoride was found.

In a previous article[2] a study of the system ammonium fluoride–potassium fluoride–water was reported. Similar measurements have been made on the corresponding system involving sodium fluoride in place of potassium fluoride. The system is a simple one; no double salts are formed, the solid phases being only ammonium fluoride and sodium fluoride. No evidence was found for the existence of hydrated sodium fluoride in the equilibrium mixture.[3]

TABLE I

ANALYSES OF SOLUTIONS AND WET RESIDUES

Solutions, weight %			Wet residues, weight %		
NH_4F	NaF	H_2O	NH_4F	NaF	H_2O
0.90	4.43	94.67	0.60	45.66	53.74
2.45	4.01	93.54	1.33	40.16	58.51
4.80	2.99	92.21	3.22	43.61	53.17
5.02	3.24	91.74	3.22	43.61	53.17
6.90	3.25	89.85	4.75	37.98	57.27
7.26	2.60	90.14	4.97	37.98	57.05
10.18	2.33	87.49	5.55	46.32	48.13
12.08	2.24	85.68	7.49	42.91	49.60
15.10	3.07	81.83	8.06	44.07	47.87
19.26	2.39	78.35	...	...	...
20.31	2.57	77.12	12.12	38.29	49.59
24.45	2.48	73.07	...	...	...
29.45	3.25	67.30	...[a]	...	...
33.26	3.15	63.59	12.76[a]	61.99	25.25
34.37	3.49	62.14	20.28	41.05	38.67
35.97	4.22	59.81	21.76	43.61	34.63
41.57	2.88	55.55	14.87	62.83	22.30
44.32	0.08	55.60	...[b]	...	...
44.49	.16	55.35	88.40	0.00	11.60
44.85	.23	54.92	...[b]	...	...
45.50	.00	54.50	...	...	...

[a] X-Ray analysis showed NaF as solid phase. [b] X-Ray analysis showed NH_4F as solid phase.

(1) This work is part of a program of research on inorganic fluorides supported by the Research Corporation and the Atomic Energy Commission.

(2) H. M. Haendler and A. W. Jache, THIS JOURNAL, **72**, 4137 (1950).

(3) Compare N. V. Sidgwick, "The Chemical Elements and their Compounds," Vol. I, The Clarendon Press, Oxford, 1950, p. 94, and H. J. Emeleus in J. H. Simons, ed., "Fluorine Chemistry," Vol. I, Academic Press, Inc., New York, N. Y., 1950, p. 27.

Experimental

As in the previous work, the Schreinemakers wet residue method was used. The apparatus was the same, with polyethylene cups fitted with motor-driven lucite stirrers. All chemicals were C.P. grade.

The solutions and wet residues were analyzed for ammonium ion and sodium ion. Ammonia was determined by distillation from alkaline solution into boric acid and titration with standard acid. Sodium was weighed as sulfate after ignition with sulfuric acid and heating with ammonium carbonate. The low concentration of sodium fluoride in the equilibrium mixture made satisfactory analysis more difficult than with the potassium fluoride system. The solutions were slow in attaining equilibrium.

In several cases the identity of the solid phase was checked by X-ray diffraction, using copper radiation with a nickel filter and a Philips 114.59 mm. powder camera.

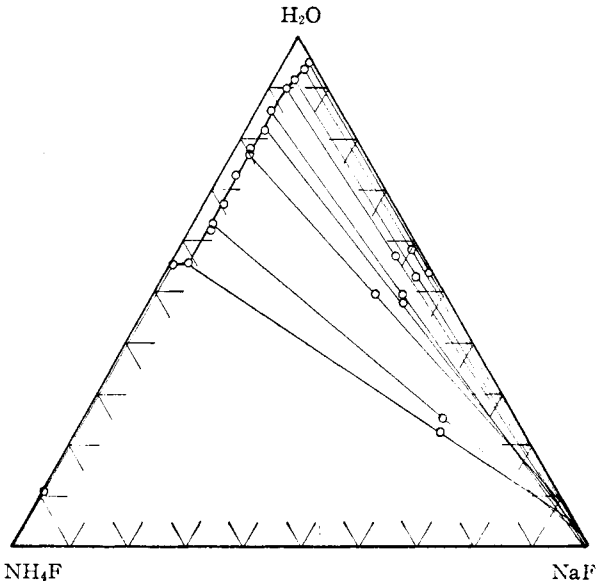

Fig. 1.—The system ammonium fluoride–sodium fluoride–water at 25°.

Results

The results of the analyses of the solutions and wet residues are given in Table I and representative points have been plotted in Fig. 1.

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