Table II. Apparent Stoichiometric Combinations of Sodium Chloride with Disodium Octaborate in Boron Oxide Phase of NaCl–B_2O_3–$NaBO_2$ System at 810° and 980° C.

Reference Points, Figure 3	NaCl / $Na_2O \cdot 4B_2O_3$	Remarks
B_2O_3 corner up to *A*	1:2	Mixtures of one combination of NaCl with $Na_2O \cdot 4B_2O_3$ and uncombined B_2O_3. (At 830° C., viscosity of melts decreases[a])
A to *B*	1:2 and 2:3	Mixtures of two combinations of NaCl with $Na_2O \cdot 4B_2O_3$ and uncombined B_2O_3. (At 830° C., viscosity of melts increases[a])
B	2:3	Uncombined B_2O_3 absent. (At 830° C., viscosity past point B decreases[a])

[a] Viscosity observations by M.H. Rowell (of this laboratory).

chloride (indicated by asterisks) and estimates of the plait point compositions of the mixtures. The respective data, incorporated in the table, indicate that the solubility of B_2O_3 in sodium chloride diminishes with increasing temperature; therefore, it is exothermic. On the other hand, the compositions of the systems at the plait points do not differ appreciably at the two temperatures used.

The log-log regression lines of the molar distribution of $NaBO_2$ between the major components of the conjugate phases (Figure 4) show that more $NaBO_2$ is available for extraction by the sodium chloride phase at 980° C. than at 810° C. This may suggest that the stabilities of disodium octaborate and disodium tetraborate, regarded as present in the systems (3), are temperature-dependent according to the equations:

$$Na_2O \cdot 4B_2O_3 \underset{T_1}{\overset{T_2}{\rightleftharpoons}} Na_2O \cdot 2B_2O_3 + 2B_2O_3 \qquad (2)$$

and

$$Na_2O \cdot 2B_2O_3 \underset{T_1}{\overset{T_2}{\rightleftharpoons}} 2NaBO_2 + B_2O_3 \qquad (3)$$

where T_1 refers to the lower and T_2 to the higher temperature.

Stoichiometric Relationships. The phase diagrams suggest that, in the composition range between the B_2O_3 corner and point *B*, two types of stoichiometric combination between NaCl and $Na_2O \cdot 4B_2O_3$ in the boron oxide phase may be formed. These stoichiometric combinations are indicated in Table II.

Empirical Equations. Neglecting the deformity at the NaCl corner at 810° C., the phase diagrams can be constructed by using the following three quantitative expressions

$$K_1 = \frac{[NaCl]}{[NaBO_2]} \cdot [B_2O_3]^{1/2} = 2.519 \text{ (mole \%)}^{1/2} \text{ at } 810° \text{ C., and}$$
$$= 2.462 \text{ (mole \%)}^{1/2} \text{ at } 980° \text{ C.}$$

for the segments of the immiscibility curve from the B_2O_3 corner to the point of the $2NaBO_2{:}3B_2O_3$ ratio,

$$K_2 = \frac{[NaCl]}{[NaBO_2]^{1/2}} \cdot [B_2O_3] = 1.0580 \times 10^2 \text{ (mole \%)}^{3/2} \text{ at } 810° \text{ C., and}$$
$$= 1.0819 \times 10^2 \text{ (mole \%)}^{3/2} \text{ at } 980° \text{ C.}$$

for the following segments to the vicinity of the respective plait points, and

$$K_3 = \frac{[NaCl]^{1/2}}{[NaBO_2]^2} \cdot [B_2O_3] = 7.625 \times 10^{-2} \text{ (mole \%)}^{-1/2} \text{ at } 810° \text{ C., and}$$
$$= 7.572 \times 10^{-2} \text{ (mole \%)}^{-1/2} \text{ at } 980° \text{ C.}$$

from the respective plait points to the NaCl corners. The curves in Figure 3 were drawn according to the above relationships.

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LITERATURE CITED

(1) Kolthoff, I.M., Sandell, E.B., "Textbook of Quantitative Inorganic Analysis," 3rd ed., p. 525, Macmillan, New York, 1953.

(2) Kotlova, A.G., Ol'shanskiĭ, Ya.I., Tsvetkov, A.I., *Tr. Inst. Geol. Rudnykh Mestorozhdeniĭ, Petrog.. Mineral. i Geokhim.* **42**, 3 (1960).

(3) Morey, G.W., Merwin, H.E., *J. Am. Chem. Soc.* **58**, 2252 (1936).

(4) Rowell, M.H., USNRDL-TR-588, 1962; *Inorg. Chem.* **4**, 1802 (1965).

(5) Stalhane, B., *Z. Elektrochem.* **35**, 486 (1929).

(6) *Ibid.*, **36**, 404 (1930).

(7) Vogel, A.I., "Quantitative Inorganic Analysis," 2nd ed., p. 245, Longmans, Green, London, 1951.

(8) *Ibid.*, p. 236.

(9) *Ibid.*, p. 266.

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CORRECTION

In the article "Equilibria in the Hydration of Propylene and of Butylenes" by C. S. Cope [J. CHEM. ENG. DATA **11**, 379 (1966)], the following corrections should be made:

Page 380, column 2, line 12: "of olefin" should read "of olefin and ether"

Page 380, Figure 1: "Ethylene Hydration (*1*)" should read "Ethylene Hydration (*6*)"

Page 381, Reaction 3: "$CH_3CH_2 = CH_2$" should read "$CH_3CH_2CH = CH_2$"

Page 381, Table V, footnote *i*: "summed" should read "assumed".

CORRECTION

In the article "Equations of State for Propyne" by T. M. Stark and Joseph Joffe [J. CHEM. ENG. DATA **9**, 327 (1964)], the equation at the bottom of page 328 should be corrected to read:

$$\frac{P}{2.0482} = \frac{T}{V} + \frac{1.734T - 1554 - 1.949 \times 10^8/T^2}{V^2} + \frac{9.241T - 5294}{V^3} +$$
$$\frac{22{,}533}{V^6} + \frac{8.342 \times 10^8 (1 + 7.759/V^2)e^{-7.759/V^2}}{V^3T^2}$$

In the nomenclature on page 329, the units for the gas constant, *R*, should be changed from cc. atm./mole ° K. to cc. atm./gram ° K.