

TABLE 1

X-Ray Data on Forms of Li_3BN_2

$\text{Li}_3\text{BN}_2(3)$ (1 atm. form)	Li_3BN_2^* (1 atm. form)	Wentorf's phase(2) (quenched from high pressure)	$\text{Li}_3\text{BN}_2(W)^*$ (quenched from high pressure)
$d(\text{\AA})$	I/I_0	$d(\text{\AA})$	I/I_0
3.81	m	3.73	10
			5.60 m
			3.60 s
3.50	s	3.47	50
		3.27	10
		3.50	mw
		3.34	mw
2.82	vs	2.78	100
		2.67	20
		3.25	w
		3.08	ms
2.63	s	2.63	30
		2.85	w
		2.78	s
2.24	w	2.22	5
		2.67	m
		2.56	mw
2.07	vs	2.07	15
		2.50	mw
		2.35	w
1.93	w	2.05	25
		1.91	5
		2.25	m
		2.15	ms
1.83	vw	2.07	vw
		2.03	m
		2.03	m
1.74	m	1.74	10
		1.96	w
		1.69	5
		1.92	w
1.64	vs	1.64	20
		1.85	mw
		1.73	mw
		1.68	vw
1.55	m	1.55	10
		1.64	m
		1.62	m
1.48	w		
		1.60	m
		1.53	m
1.42	w		
		1.50	vw
1.40	w		
		1.44	w
		1.41	w

* X-ray results from present study; data taken on GE x-ray diffractometer with $\text{CrK}\alpha$ radiation; s=strong; m=medium; w=weak; v=very. Additional weak lines at smaller d-spacings are found in published data from references (2) and (3).

that of Li_3AlN_2 and the other members of an isomorphous series (6) formed by substitutions for Al^{3+} and for N^{3-} . Since the structures of these compounds are based on an anti- CaF_2 lattice (i.e., N^{3-} in Ca^{2+} sites), compression along $\langle 111 \rangle$ could result in a layer lattice of hexagonal symmetry with layers of close-packed N^{3-} ions perpendicular to the hexagonal "c" axis.

The lath-like morphology of this form is best developed between 1000°C and 1400°C above 40 kb. Quenched runs from the liquid region above the melting curve of the high pressure form are characterized by fine-grained clusters of equant crystals, and the x-ray patterns differ somewhat in peak intensity from those of crystals quenched from the stability region of the phase. These differences appear to be related to a more random orientation obtained when preparing an x-ray slide with the material quenched from the liquid.

$\text{Li}_3\text{BN}_2(\text{W})$ is also markedly less soluble in water at room temperature than the low pressure form.

Results and Discussion

General

Our interpretation of the results is summarized in the P-T representation of Fig. 2 in which a large area of stability of $\text{Li}_3\text{BN}_2(\text{W})$ exists. Some aspects of this interpretation need amplification.

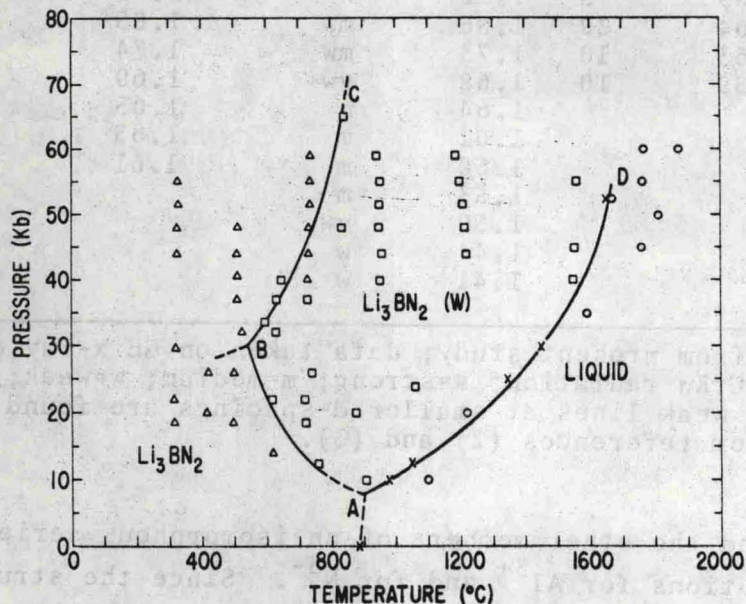


FIG. 2
P-T Diagram for the
System Li_3BN_2
Quench data indicated by Δ, \square, \circ ;
thermal analysis
data by \times

A clean separation of a homogeneous sample from the center of a cell in which a temperature gradient existed was sometimes difficult to obtain. Particularly near the P-T conditions where