substance: boron compounds with group II elements
property: properties of boron-beryllium compounds

Chemical bond dependence of coulomb capture of pions in beryllium borides [85I].

Cu-K_β radiation inelastically scattered from beryllium and boron interferenced by K-MM radiative Auger transitions [96P].

B K edges of a number of compounds containing beryllium and boron in Fig. 1 [97G].

Parallel electron energy-loss spectra (PEELS) of some Be-B compounds showing the Be and B K edges and illustrating the changes in the relative core-loss peak intensities with change in Be:B ratio in Fig. 2 [97G].

Be_5B

metallic conduction; preparation [75S, 63B]; crystalline structure [63B], electrical conductivity [75S]

Entropy in [86B].

Be_2B

metallic conduction; preparation [75S]; crystalline structure [63B]; electrical conductivity [75S]

Discussion on the confusion regarding the stoichiometry of this and related compounds in [97G].

Entropy in [86B].

BeB_2

semimetallic behavior (?); preparation [75S, 61S]; electronic structure [77P, 77S1]; electrical conductivity [75S]

Compound identified as $Be_{2.8(1)}B_2$ with an extended homogeneity range by parallel electron energy-loss spectroscopy (PEELS) [97G].

Entropy in [86B].

BeB_3

preparation [61S, 76M]; crystalline structure [76M]

Space group: $P6_3/mmm$

lattice parameters

a	9.800(1) Å	*T* = 300 K	X-ray diffraction	75M,
c	9.532(1) Å			87L

BeB_4

Structure

lattice: tetragonal [75S], similarity to UB_4 assumed.

No lattice parameters available.

Physical properties

resistivity

ρ	$1.1 \cdot 10^7$ Ω cm	*T* = 300 K	polycrystalline material	75S

density

d	2.57 g cm^{-3}	*T* = 300 K	pycnometric	75S

melting point

T_m	> 2000°C			75S

BeB_6

Structure

lattice: tetragonal (related to AlB_{12}) [61H; 61S; 77M1].

lattice parameters

a	10.16 Å	*T* = 300 K	X-ray diffraction	61H
c	14.28 Å			

Physical properties

For electronic structure, cp. [77E, 77P].

resistivity

ρ	$1.1 \cdot 10^7$ Ω cm	*T* = 300 K	polycrystalline material	75S

density

d	2.33 g cm^{-3}	*T* = 300 K	X-ray	75S
	2.35 g cm^{-3}	*T* = 300 K	pycnometric	75S

melting point

T_m	> 2000°C			75S

BeB_9

semiconductor; preparation [61S, 75S]; electrical conductivity [75S]

$BeB_{9–12}$

Discussion on the different structures attributed to this composition in [97G].

lattice parameters

a	8.857(2) Å	*T* = 300 K	$BeB_{9.6}$	87H
c	5.116(1) Å			

microhardness

H_V	2920(80) kg mm^{-2}	*T* = 300 K	$BeB_{9.6}$	87H

BeB_{12} (rhombohedral)

α-rhombohedral boron structure group

lattice parameters
(*a*, *c* in Å)

a	5.461	*T* = 300 K	X-ray diffraction	66K
c	12.42			
c/a	2.27			94L
a	5.80	*T* = 300 K		91L
c	11.90			
c/a	2.27			
V	321 $Å^3$			

BeB_{12}

Preparation (heating of the elements (ratio 1:6)) in [97G].

Structure

The crystal structure is directly related to a-tetragonal boron (tetr. I; see section 8.1, vol.17e). The unit cell contains four B_{12} icosahedra, two beryllium atoms at the sites of the bisphenoidally coordinated boron atoms

(position 2(b)) and two beryllium atoms at the interstitial voids (position 2(a)).

lattice: tetragonal; space group: D_4^4 – $P4_12_12$; 52 atoms per unit cell [77B, 77M2].

lattice parameters

a	8.80 Å	*T* = 300 K		77B1
c	5.08 Å			

Physical properties

electronic band structure: cp. [77P]

optical transmission: Fig. 3

density

d	2.36 g cm^{-3}	*T* = 300 K		77B

melting point

T_m	> 2000ºC			75S

Be_4B_5

$Be_4B_{5.00(15)}$, identified as a minor intergranular phase in commercial Be_2B [97G].

BeB_2C_2

Isostructural to LiBC.

Preparation and structure in [97G].

electronic properties

Core-loss spectrum in Fig. 4 [97G].

$Be_{0.5}B_5N$

($Be_{0.5(1)}B_{4.9(3)}N$)

Structure: rhombohedral (α-rhombohedral boron structure group)

Preparation (heating of Be and B (ratio 1:12) at 1700°C, N comes from the hBN crucible) and structure in [97G].

lattice parameters

a	5.487(5) Å	*T* = 300 K	X-ray diffraction	97G
c	12.486(14) Å			

electronic properties

Core-less edges in Fig. 5 [97G].

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77M2 Matkovich, V. I., Economy, J.: see [77B], p. 96.

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77S1 Samsonov, G. V., Kovenskaya, B. A.: see [77B1], p. 19.

77S2 Spear, K. E.: see [77B], p. 439.

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Fig. 1.

Be-B compounds. B K edges of a number of compounds containing beryllium and boron. The dashed vertical lines mark the lowest energy onset, in Be_3B (metallic) and the greatest energy onset, in $Be_2BO_3(OH)$ (insulating) [97G].

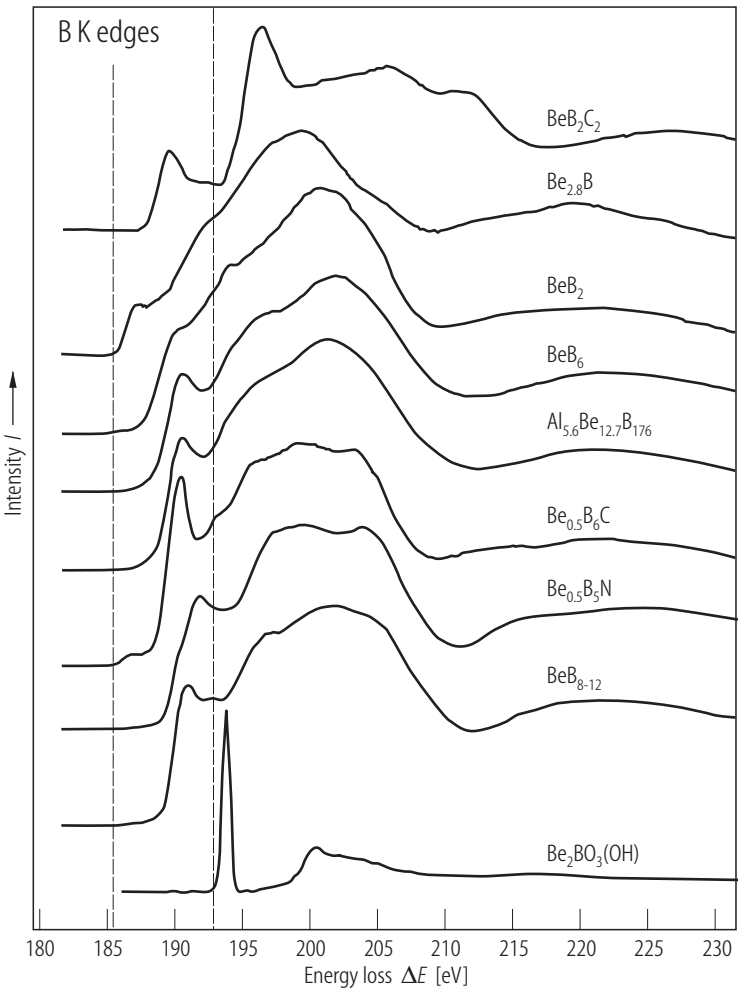

Fig. 2.

Be-B compounds. Low resolution parallel electron energy-loss spectra (PEELS) of some Be-B compounds showing the Be and B K edges and illustrating the changes in the relative core-loss peak intensities with change in Be:B ratio [97G].

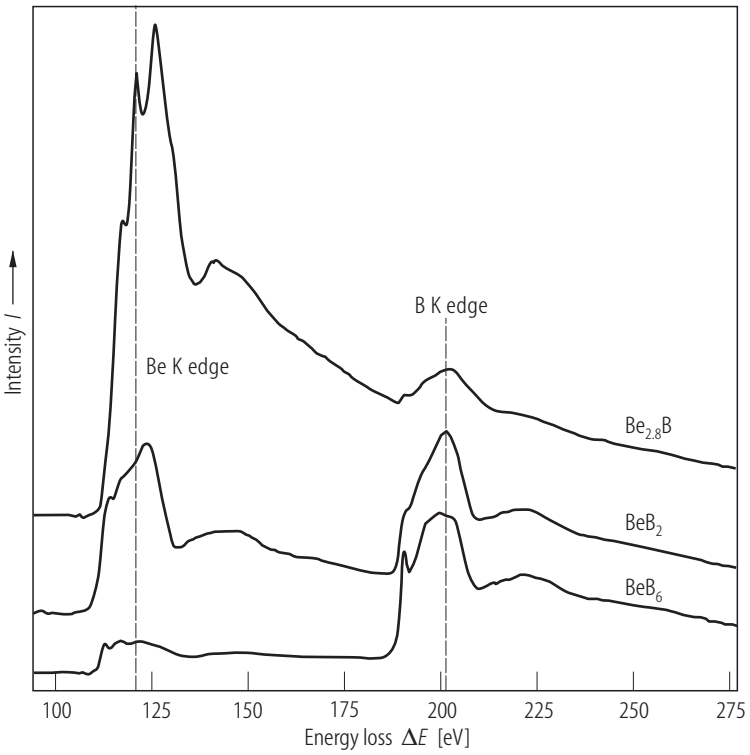

Fig. 3.

BeB_{12}. Transmission vs. wavenumber in the lattice vibration range [77B].

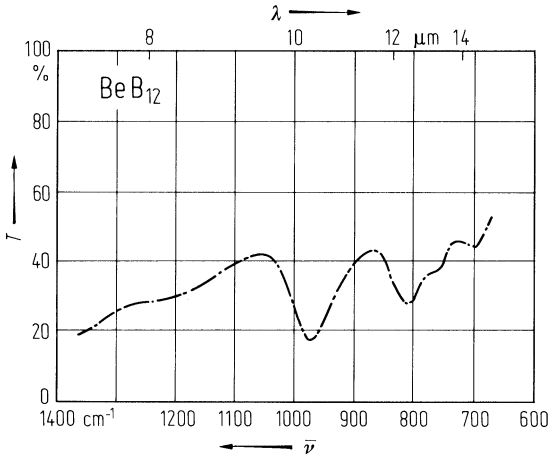

Fig. 4.

BeB_2C_2. Core loss spectrum. The K core-loss edges are a projection of the atom resolved, partial density of states of the conduction band representing the unoccupied p states for the ionized atom [97G].

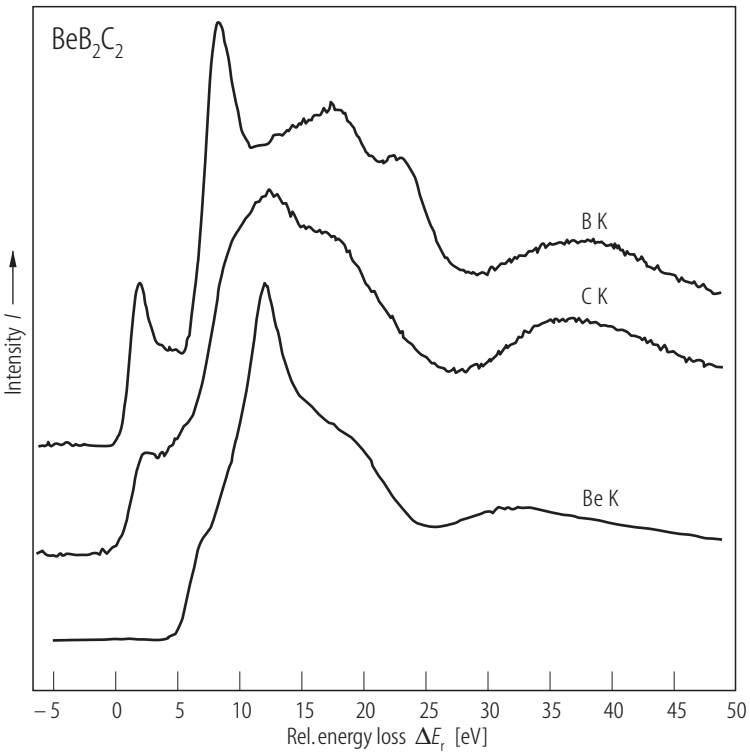

Fig. 5.

$Be_{0.5}B_5N$. Core-loss edges for Be, B and N atoms [97G].