2. The amount of platinum applied on the carbon fibers is a function of the acidic–basic properties of the surface of the carbon fibers.

LITERATURE CITED

THERMAL TRANSFORMATIONS OF \( B_{10}H_{12}(NH_3)_2 \), \( B_{10}H_{12}(C_5H_5N)_2 \),
AND \( B_{10}H_{12}(C_5H_7N)_2 \)

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Data on the thermal transformations of a series of nonionic and ionic derivatives of higher boranes, including the anions \( B_3H_6^- \), \( B_{10}H_{10}^- \), \( B_{12}H_{12}^- \), and some complexes \( B_{10}H_{12}L_2 \), where \( L \) is a Lewis base, are given in [1, 2].

The purpose of this investigation was to study the thermolytic products of a series of nido derivatives of decaborane(14) of the type \( B_{10}H_{12}L_2 \), where \( L \) is \( NH_3 \), Py, or quinoline, which are thermally stable. In the thermolysis process, both reaction of the nido-cluster \( B_{10}H_{12} \) or its residue with the nitrogen or carbon of \( L \) with formation of BN fragments or carbides, and dissociation of \( B_{10}H_{12}L_2 \) to \( B_{10}H_{12}L \) [3] are possible.

EXPERIMENTAL

\( B_{10}H_{12}L_2 \) were synthesized according to [4]: \( B_{10}H_{12}(NH_3)_2 \) by reaction of \( B_{10}H_{14} \) with \( NH_3 \) in hot toluene, the pyridine and quinoline derivatives by exchange reactions of \( B_{10}H_{12}-[(CH_3)_2S]_2 \) with the corresponding \( L \). The products obtained were purified by recrystallization and characterized by IR and NMR \(^{11}B \) spectra using data from [4], and analytically. The method and instrument described in [1, 5] were used for recording the DTA curves and gas evolution of \( B_{10}H_{12}L_2 \). IR spectra were recorded on a UR-20 spectrophotometer as KBr pellets. Large quantities of the high-temperature pyrolysis products of \( B_{10}H_{12}L_2 \) were obtained by their heating in a hydrogen reactor in a stream of pure Ar for 5 h at 850°C. Under these conditions, practically all hydrogen was lost.

DISCUSSION

Figure 1 shows the DTA curves and gas evolution for \( B_{10}H_{12}(C_5H_5N)_2 \) (I) and \( B_{10}H_{12}(C_5H_7N)_2 \) (II). Thermolysis data for \( B_{10}H_{12}(NH_3)_2 \) (III) are given in [1]. The results show an absence of melting effects for (I), exo- and endo-effects at 237 and 253°C, and intense

gas evolution. Upon further heating to 600°C, thermal effects are not observed while gas evolution continues. Bands characteristic of methane [6] are observed in IR spectra of the gas phase given off in heating BiH12(C6H5N)2 to 280°C. We note that published observations on the melting point of (I) are contradicted: 207 [7] and 300°C (with decomposition) [4]. The exo-effect at 217°C is irreversible and related to the change in the nature of the initial compound. Results of the study of thermal transformations of (II) (Fig. 1, b) show that the decomposition of this compound also proceeds without melting and is accompanied by gas evolution with an exo-effect at 245°C. Raising the temperature to 600°C leads to gas evolution without observed thermal effects. Thermograms of (III) show weak gas evolution at 230°C [1]. Intensive decomposition of the material with a large exo-effect occurs at 260°C. Melting is not observed and H2 is seen in the gas phase. Upon further heating to 700°C, gas evolution without significant thermal effects occurs.

Thus, it is established thermographically that BiH12L2 are decomposed without melting and the start of their rapid decomposition is accompanied by exo-effects occurring in the relatively narrow temperature range 237-260°C. Dissociation of NH3 or Py from BiH12L2 does not occur, but the thermal transformations of these compounds are connected with decomposition of L. IR spectra of (I) and the products of its thermolysis in a stream of Ar up to 280°C were recorded. Seven bands of weak and medium intensity in the region 3030-3122 cm⁻¹ with the strongest band at 3072 cm⁻¹, assigned to the C-H stretch [4] are observed in the spectrum of (I). They are absent in the spectrum of the thermolysis product. Such a change in the spectrum confirms the loss of hydrogen from L. The B-H bonds appear as a broad band with maximum at 2487 cm⁻¹. IR spectra of the obtained by heating (III) to 300°C are given in [1]. A broad band in the B-H stretching region with maximum at 2517 cm⁻¹ and intense broad bands at 3000-3300 cm⁻¹ are observed in them. The latter can be assigned to vN-H, which is different than the N-H vibration of NH3 in (III) (3233, 3284 cm⁻¹). Apparently, complete loss of hydrogen from the BiH12 cluster and from NH3 under these thermolysis conditions does not occur.

The substances obtained by heating BiH12L2 at 850°C for 5 h in a stream of Ar are black, x-ray amorphous powders. Bands in the 700-1700 cm⁻¹ region are observed in their IR spectra. Bands at 812 and 1372 cm⁻¹, assigned to B-N vibrations [8], appear sharp only in thermolysis products from (I) and (III). Bands at 1100-1500 cm⁻¹, assigned to B=C [9] vibrations are seen in the spectra of thermolysis products of (I) and (II).

Table 1 gives the analytical results obtained for the solid thermolysis products. Here M1/M2 is the ratio of mass before and after pyrolysis (each value is the result of parallel determinations for six samples). The B/N ratio lies in the range 4.74-5.21,