

**Faculty of Science**

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**Title: Synthesis, characterization, and spectrophotometric studies of novel fluorescent arachno decaborane and nonaborane clusters containing aza-distyrylbenzene derivatives.**

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**Published In: Jornaol of organometallic chemistry, 693 (2008)**

**Impact Factor:1.9**

**Abstract:**

Two azo-analogues of distyrylbenzene namely: 1,4-bis[B-94-quinolyl]vinyl] benzene (pHQ) and 1,4-bis[B-4-pyridyl]vinyl] benzene (PhPy) containng arachno-decaborane or arachno-nonaborane clusters have been isolated: 6,9-(PhQ)<sub>2</sub>-arachno-B<sub>10</sub>H<sub>12</sub> (1), N,N'-bis [9-Me<sub>2</sub>S-arachno-B<sub>10</sub>H<sub>12</sub>-6-yl]PhQ (2) , 6,9-(PhPy)<sub>2</sub> – arachno-B<sub>10</sub>H<sub>12</sub> (3), N,N'-bis [9-Me<sub>2</sub>S)-arachno-B<sub>10</sub>H<sub>12</sub>-6-Yl]PhPy (4), N,N'-bis[arachno-B<sub>9</sub>H<sub>13</sub>-4-yl]PhQ (5), 4-PhQ-arachno-B<sub>9</sub>H<sub>13</sub> (6) , N,N'-bis[arachno-B<sub>9</sub>-H<sub>13</sub>-4-yl]PhPy (7), and PhPy-arachno-B<sub>9</sub>H<sub>13</sub> (8). These boronated compounds were easily prepared from the displacement reactions of weaker ligand (SKe<sub>2</sub>) of bis (dimethyl sulfide) arachno-decaborane (14) [6,9-(Me)<sub>2</sub>SB<sub>10</sub>H<sub>12</sub>] or dimethyl sulfide –arachno-nonaborane [4-(Me)<sub>2</sub>SB<sub>9</sub>H<sub>13</sub>] by the stronger bidentate ligands of PhQ or PhPy in ratio (1:2). The electronic interaction between decaborane or nonaborane arachno-type unit and the bonded pyridine units has been investigated by UV-Vis spectroscopy and by AM1 molecular orbital caclulations. The resulting compounds undergo trans-cis photoisomerization upon excitation. The connection of boron clusters to PhQ and PhPy led to enhancing of the photoreactivity and decreasing of the fluorescence quantum yield of the products.

**Key words:**

NMR spectroscopy; Mo-calculations; Laser dyes, Aza-distyrylbenzene