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Contents

Communications

Malek Nechab, Erwan Le Gall, Michel Troupel, Jean-Yves Nédélec

J. Organomet. Chem. 691 (2006) 1809

Synthesis of alkyl- and aryldiphenylphosphines via electrogenerated magnesium chloride diphenylphosphanide A two-steps procedure allowing the formation of alkyldiphenylphosphines and aryldiphenylphosphines in good yield is described. It relies on the electrochemical preparation of magnesium chloride diphenylphosphanide and its subsequent coupling with either alkyl halides or aryl fluorides.



Björn Hellbach, Frank Rominger, Rolf Gleiter

J. Organomet. Chem. 691 (2006) 1814

Silver(I) complex of 5,6,11,12-tetradehydrodibenzo[*a*,*e*]cyclooctene The reaction of 5,6,11,12-tetradehydrodibenzo[*a*,*e*]cyclooctene with silver(I)triflate yielded a 1:2 complex. X-ray investigations revealed that each silver ion is tetrahedrally coordinated to one triple bond and three oxygen atoms of the triflate anion.



Regular papers

Yingzhong Shen, Hongwei Gu, Yu Zhu, Yi Pan

J. Organomet. Chem. 691 (2006) 1817

Synthesis, characterization and luminescence study of dialkyl[1-arylmethyleneimino-2-naphthonato]gallium complexes: Crystal structure of dimethyl[1-(2-pridyl) methyleneimino-2naphthonato]gallium

Eight dialkylgallium complexes of type R_2GaL [(M = Me, L = 1-(2-pyridyl)methyleneimino-2-naphthonato (1), M = Et, L = 1-(2-pyridyl)

methyleneimino-2-naphthonato (2), M = Me, L = 1-phenylmethyleneimino-2-naphthonato (3), M = Et, L = 1-phenylmethyleneimino-2naphthonato (4), M = Me, L = 1-(*p*-methoxylphenyl)methyleneimino-2-naphthonato (5), M = Me, L = 1-(3,4-dimethoxylphenyl) methyleneimino-2-naphthonato (6), M = Me, L = 1-naphthylmethyleneimino-2-naphthonato (7), M = Me, L = 1-naphthylmethyleneimino-2-naphthonato (8)) have been Prepared. Structure of 1 has been determined by X-ray analysis. The electroluminescent properties of 3, 5, 7 and 8 have been measured. The maximum emission wavelengths are in the range of 450 and 480 nm.



Taimur A. Shaikh, Ronald C. Bakus II, Sean Parkin, David A. Atwood

J. Organomet. Chem. 691 (2006) 1825

Structural characteristics of 2-halo-1,3,2dithiarsenic compounds and tris-(pentafluorophenvlthio)-arsen

The combination of various dithiols and AsX₃ (X = F, Cl) produces the series of cyclized halo-arsenic dithiolate compounds which up to this point have been lacking full characterization and structural description. This series of compounds has been characterized by IR. ¹H. ¹⁹F, and ¹³C NMR, X-ray crystallography and GC-MS.

Andreas Kleineweischede, Jochen Mattay

J. Organomet. Chem. 691 (2006) 1834

Synthesis, spectroscopic and electrochemical studies of a series of transition metal complexes with amino- or bis(bromomethyl)substituted dppz-ligands: Building blocks for fullerene-based donor-bridge-acceptor dyads

Synthesis of polypyridyl complexes of the type $(\alpha$ -diimine)ML_n with ML_n = Ru(bipy)²⁺₂, Re(CO)₃Cl, or Cu(PPh₃)₂ has been described. Nitro-, amino-, and bis(bromomethyl)substituted dppz derivatives were used as α -diimine ligands. The electronic and electrochemical properties of these complexes have been investigated by UV/Vis spectroscopy and by cyclic voltammetry.



1a-e: [Ru(bpy)₂]²⁺ a: L = ndppz 2a-e: [Re(CO)₃Cl] 3a-e: [Cu(PPh₃₎₂]*

b: L = dndppz **c**: L = adppz

11

d: L = dadppz

e: L = dbrdppz

M.Z. Kassaee, S.M. Musavi, M. Ghambarian

J. Organomet. Chem. 691 (2006) 1845

A quest for triplet silylenes XHSi3 at ab initio and DFT levels (X = H, F, Cl and Br)

Four triplet ground state silvlenes 3_{t-x} and 4_{t-x} (where X = F and Cl) appear more stable than their corresponding singlet states. This is found through the comparison of singlet-triplet energy splittings for 30 XHSi₃ silvlenes at seven levels of ab initio and DFT (X = H, F, Cl, and Br).



1-X-1,2,3- trisilapropargylene $(3_{t,x} \text{ where } X = F \text{ and } Cl)$



3-X-1,2,3-trisilapropargylene $(4_{t-X} \text{ where } X = F \text{ and } Cl)$

Thouraya Turki, Taha Guerfel, Faouzi Bouachir

J. Organomet. Chem. 691 (2006) 1857

Preparation and structural characterization of tetracoordinated tungsten(II) diazadiene complexes

A series of diamagnetic tungsten diazadiene complexes (DAD)WCl2 has been prepared and characterised. Their crystal structural indicate a slightly distorted tetrahedral coordination sphere.



V

Santosh Singh Thakur, Shu-Wei Chen, Wenji Li, Chang-Kyo Shin, Seong-Jin Kim, Yoon-Mo Koo, Geon-Joong Kim

J. Organomet. Chem. 691 (2006) 1862

A new dinuclear chiral salen complexes for asymmetric ring opening and closing reactions: Synthesis of valuable chiral intermediates Dinuclear chiral salen complexes bearing Lewis acid of group 13 metals catalyze asymmetric ring opening of various terminal epoxides with myriad of nucleophiles via kinetic resolution. The complexes are also found to be active for asymmetric cyclization reaction too.



Hitoshi Kuniyasu, Tomohiro Kato, Masafumi Inoue, Jun Terao, Nobuaki Kambe

J. Organomet. Chem. 691 (2006) 1873

The first definitive example of oxidative addition of acyclic vinyl selenide to M(0) complex

The principle of C–S bond activation of acyclic vinlyl sulfide by platinum(0)-complex was successfully applicable to the C–Se bond fission of vinyl selenide to produce vinyl platinum.



Emma C. Fitzgerald, Richard W. Grime, Heather C. Knight, Madeleine Helliwell, James Raftery, Mark W. Whiteley

J. Organomet. Chem. 691 (2006) 1879

Synthesis of the sterically crowded cycloheptatrienyl complexes $[M(CO)(PPh_3)_2(\eta-C_7H_7)]^+$ (M = Mo or W): X-ray crystal structures of $[W(CO)(PPh_3)_2(\eta-C_7H_7)][BF_4]$ and $[W(CO)_2(PPh_3)(\eta-C_7H_7)][BF_4] \cdot CH_2Cl_2$

Syntheses of the first examples of bis-(triphenylphosphine)cycloheptatrienyl complexes $[M(CO)(PPh_3)_2(\eta-C_7H_7)]^+$ (M = Mo or W) are described. The X-ray structure of the W complex reveals structural modifications consistent with a sterically crowded system.



Taegweon Lee, Kyu Ho Song, Il Jung, Youngjin Kang, Soo-Hyoung Lee, Sang Ook Kang, Jaejung Ko

J. Organomet. Chem. 691 (2006) 1887

Silylene-spaced diphenylanthracene derivatives as blue-emitting materials

A novel series of blue emitting silylene-spaced diphenylanthracene derivatives have been synthesized and characterized.



Margarita Crespo, Mercè Font-Bardía, Xavier Solans

J. Organomet. Chem. 691 (2006) 1897

A comparative study of metallating agents in the synthesis of [C,N,N']-cycloplatinated compounds derived from biphenylimines New [C,N,N'] cyclometallated platinum(II) compounds derived from 2- and 4-biphenylimines as well as their [N,N'] precursors were prepared using *cis*-[PtCl₂(dmso)₂] or *cis*-[PtPh₂(SMe₂)₂] as substrates. The influence in these reactions of the phenyl substituent in 2or 4-positions and the reactivity of the obtained compounds towards oxidative addition were studied.



cis-[PtCl₂(dmso)₂] or cis-[PtPh₂(SMe₂)₂]

Joji Ohshita, Yuki Izumi, Zhou Lu, Junnai Ikadai, Atsutaka Kunai

J. Organomet. Chem. 691 (2006) 1907

Ring-opening reactions of cyclic ethers with diiodo- and dibromodimethylsilane equivalents

Ring-opening halosilation of cyclic ethers with reagents of $(Me_2N)_2SiMe_2/4MeI$ (1a) and $(Me_2N)_2SiMe_2/4allylBr$ (1b) gave ring-opened di(haloalkoxy)dimethylsilanes in good yield. When similar reactions were carried out with $(Me_2N)_2SiMe_2/2MeI$ (2a) and $(Me_2N)_2SiMe_2/2$ allylBr (2b) in a ratio of cyclic ethers/2a or 2b = 1/1, the corresponding 1:1 adducts were obtained.



J.W. Faller, Philip P. Fontaine

J. Organomet. Chem. 691 (2006) 1912

Ruthenium catalyzed enyne cycloisomerizations and hydroxycyclizations with skeletal rearrangement A neutral arene-tethered ruthenium complex was found to be a catalyst precursor for enyne cycloisomerizations and hydroxycyclizations.



Muhammad D. Bala, Demetrius C. Levendis, Neil J. Coville

J. Organomet. Chem. 691 (2006) 1919

Solid-state cis-trans isomerization reaction of $(\eta^5-MeC_5H_4)W(CO)_2P(O^iPr)_3I$

The solid-state *cis-trans* isomerization of $(\eta^5 \text{MeC}_5\text{H}_4)W(\text{CO})_2P(O^i\text{Pr})_3I$ was monitored by in situ (PXRD) and post reaction (NMR spectroscopy) techniques to yield data consistent with a first-order reaction and an activation energy of 50–60 kJ mol⁻¹.



Xuan Xu, Liang Fang, Zhao-Xing Chen, Guo-Chun Yang, Shi-Ling Sun, Zhong-Min Su

J. Organomet. Chem. 691 (2006) 1927

Quantum chemistry studies on the Ru–M interactions and the 31 P NMR in [Ru(CO)₃-(Ph₂Ppy)₂(MCl₂)] (M = Zn, Cd, Hg)

Density functional theory PBE0 method was applied to study the Ru–M interactions and their effects on ³¹P NMR in complexes [Ru-(CO)₃(Ph₂Ppy)₂MCl₂] (M = Zn; Cd; Hg). The ³¹P chemical shifts of complexes were calculated by PBE0-GIAO method. Meanwhile, the stabilities of binuclear complexes were discussed by binding energies.



The structure of [Ru(CO)₃(Ph₂Ppy)₂(MCl₂)] (M=Zn, Cd, Hg)

Malcolm L.H. Green, J. Walker, P. Mountford, John B. Leach, Malcolm A. Kelland

J. Organomet. Chem. 691 (2006) 1934

Reactions of pentaborane(9) with electron-rich molybdenum and tungsten phosphine polyhydrides

Reaction of $[W(PMe_2Ph)_3H_6]$ with pentaborane(9) gives *nido*-2- $[W(PMe_2Ph)_3H_2B_4H_8]$ (1) as well as *nido*-2- $[W(PMe_2Ph)_3HB_5H_{10}]$ (2).

Leonard Joachim Pereira, Weng Kee Leong

J. Organomet. Chem. 691 (2006) 1941

Group 15 ligand migration in the heteronuclear clusters $RuOs_3(\mu-H)_2(CO)_{12}(EPh_3)$ (E = P, As, Sb) tallaborane structure containing an edgebridging {BH₃} group between the tungsten atom and one of the basal boron atoms in a "*nido*-WB₄" pyramid. Reaction of [W(PMe₃)₄(η^2 -CH₂PMe₂)H] with pentaborane(9) gives *nido*-2-[W(PMe₃)₃H₂B₄H₈] (**3**) whilst reaction of [Mo(L)₄H₄] with pentaborane(9) gives *nido*-2-[Mo(L)₃H₂B₄H₈] [L = PMe₃ (**4**), PMe₂Ph (**5**)]. Treatment of [Mo(P-Me₃)₄H₄] with excess BH₃ · thf gives the known borohydride [Mo(PMe₃)₄H(η^2 -BH₄)].

The crystal structure of (2) has been de-

termined. Compound (2) has a novel me-



The monosubstituted clusters $RuOs_3(\mu-H)_2(CO)_{12}(EPh_3)$ (where E = P, As, Sb) exhibit isomers in which the group 15 ligand is on an Os or an Ru vertex. Evidence is presented for hydride fluxionality and EPh₃ ligand migration. These processes have been examined by variable temperature NMR studies, and the kinetic parameters estimated.



Peng Xue, Herman S.Y. Sung, Ian D. Williams, Guochen Jia

J. Organomet. Chem. 691 (2006) 1945

Alkyne oligomerization mediated by rhodium complexes with a phosphinosulfonamido ligand and isolation and characterization of a rhodacyclopentadiene complex $[Rh(COD)(Ph_2PCH_2CH_2NT_5)]$ is catalytically active for polymerization of arylalkynes and for cyclotrimerization of HC=CCOR. A rhodacyclopentadiene complex was isolated from the reaction of $[Rh(COD)(Ph_2PCH_2CH_2NT_5)]$ with ethyl propiolate.



Ashok K.S. Chauhan, Anamika, Arun Kumar, Puspendra Singh, Ramesh C. Srivastava, Ray J. Butcher, Jens Beckmann, Andrew Duthie

J. Organomet. Chem. 691 (2006) 1954

Structural characterization of rare intramolecularly (1,4-Te \cdots N) bonded diorganotellurides and their monomeric complexes with mercury(II) halides: Metal assisted C–H \cdots X (Hg) interactions leading to supramolecular architecture Monomeric tellurides, 4-RC₆H₄(SB)Te [SB = 2-(4,4'-NO₂C₆H₄CH=NC₆H₃-Me); R = H, **1a**; Me, **1b**; OMe, **1c**] with rare 1,4-Te···N intramolecular interactions and their monomeric 2:1 complexes with Hg(II) halides have been prepared and characterized by solution and solid-state ¹²⁵Te NMR, ¹³C NMR and Xray crystallography. Intermolecular non-covalent weak C-H···O, C-H···π and C-H···Cl/ Br interactions involving halogen atom bound to mercury with significant directionality are recognized to be responsible in the formation of supramolecular motifs.



Luigi Angiolini, Daniele Caretti, Laura Mazzocchetti, Elisabetta Salatelli, Rudolph Willem, Monique Biesemans

J. Organomet. Chem. 691 (2006) 1965

Triorganotin 4-isopropylbenzoates as model transesterification catalysts for triorganotin carboxylates grafted to cross-linked polystyrene New triorganotin 4-isopropylbenzoates (R = Me, Bu and Ph) have been prepared and tested as transesterification catalysts showing different activity according to the substituents at tin. Details related to the transesterification mechanism and the role of Lewis acidity of tin atom have been revealed by Sn NMR investigation.

Paul A. Deck, Benjamin D. McCauley, Carla Slebodnick

J. Organomet. Chem. 691 (2006) 1973

Transition metal cyclopentadienyl complexes bearing perfluoro-4-tolyl substituents

The reaction of NaCp with $C_6F_5CF_3$ gives cyclopentadienes bearing one, two, three, or four perfluorotolyl substituents. Sodium salts of these cyclopentadienes serve as ligands for early and late transition metals complexes, such as the manganese tricarbonyl complex shown.

OSnR₃

Kaichun Gu, Gang Yang, Weiping Zhang, Xiumei Liu, Zhengkun Yu, Xiuwen Han, Xinhe Bao

J. Organomet. Chem. 691 (2006) 1984

An experimental-theoretical approach to the kinetics and mechanism of Michael type addition: α,β -Unsaturated tungsten Fischer carbene complex as the substrate

The kinetics and mechanism of Michael type addition using alkynyl carbene complex as substrate are investigated by variable-temperature ¹H and ¹³C NMR experiments and density functional calculations. The Michael type addition to β -pyrazolato- α , β -unsaturated carbene complexes contains three elementary steps including two transition states and two intermediates. The second step is conformation conversion, which is very important but ignored before.



Ofir Baum, Israel Goldberg, Morris Srebnik

J. Organomet. Chem. 691 (2006) 1993

Novel boracycles from 2-amino-2-methylpropan-1-ol and borane methyl sulfide: Synthesis and X-ray crystal structures Reacting 2-amino-2-methylpropan-1-ol with borane methyl sulfide (BMS) gave the structures 6 and 7 determined by single crystal X-ray.



Tsun-Ren Chen, Rong-Hong Chien, Anchi Yeh, Jhy-Der Chen

J. Organomet. Chem. 691 (2006) 1998

Synthesis, characterization and electroluminescence of B(III) compounds: BPh₂(2-(2-quinolyl)naphtho[*b*]imidazolato) and BPh₂-(2-(2-quinolyl)benzimidazolato) We have demonstrated two novel luminescent boron compounds, $BPh_2(2-(2-quinolyl)-naphtho[b]imidazolato)$ and $BPh_2(2-(2-quino$ lyl)benzimidazolato), which could be of interest for practical applications, especially for OLED.

 $\begin{array}{c} & & \\ & &$

Rodrigo S. Bitzer, Robson P. Pereira, Ana Maria Rocco, José Guilherme S. Lopes, Paulo Sérgio Santos, Marco A.C. Nascimento, Carlos A.L. Filgueiras

J. Organomet. Chem. 691 (2006) 2005

A contribution to the coordination chemistry of 2,3,5,6-tetrakis(α -pyridyl)pyrazine (TPP): Synthesis, spectroscopy, electrochemistry, and density-functional study of {[Mo(CO)₄]₂(μ -TPP)}

 ${[Mo(CO)_4]_2(\mu\text{-}TPP)}$ (1) was synthesized in 89% yield from *cis*-[Mo(CO)_4(piperidine)_2] and 2,3,5,6-tetrakis(α -pyridyl)pyrazine (TPP) in the 3:1 (Mo:TPP) stoichiometric ratio. This bimetallic complex was characterized by several spectroscopic techniques and by cyclic voltammetry. Additionally, a theoretical study of its molecular structure and vibrational frequencies was performed at the DFT/B3LYP level of calculation.



Chunlin Ma, Guangru Tian, Rufen Zhang

J. Organomet. Chem. 691 (2006) 2014

New triorganotin(IV) complexes of polyfunctional S,N,O-ligands: Supramole-cular structures based on $\pi \cdots \pi$ and/or C–H $\cdots \pi$ interactions

A series of new triorganotin(IV) complexes with 4-hydroxy-2-mercapto-6-methylpyrimidine (L¹H₂), 4-hydroxy-2-mercapto-pyrimidine (L²H₂), 2,4(1H,3H)-pyrimidinedithione (L³H₂) (Scheme 1) of the type R₃SnLSnR₃ (R = Me 1, 4, 7; R = Ph 2, 5, 8; R = PhCH₂ 3, 6, 9) have been synthesized by reactions of triorganotin(IV) chloride and corresponding ligands. Among them, complexes 2, 5 and 8 are also characterized by X-ray crystallography diffraction analyses. Significant $\pi \cdots \pi$ stacking, C–H $\cdots \pi$ interactions and intramolecular hydrogen bonds stabilize these structures.



Li-Ming Tang, Yi-Qun Duan, Xiao-Fang Li, Yue-Sheng Li

J. Organomet. Chem. 691 (2006) 2023

Syntheses, structure and ethylene polymerization behavior of β -diiminato titanium complexes

A series of new titanium complexes $[(Ph)NC(R_1)CHC(R_2)N(Ph)]_2TiCl_2$ has been synthesized and characterized, and is shown to be active catalysts for ethylene polymerization.



Eckhart Louis, Ibrahim Jussofie, Fritz E. Kühn, Wolfgang A. Herrmann

J. Organomet. Chem. 691 (2006) 2031

Karstedt Catalyst – Catalyzed stepgrowth copolyaddition of 1,9-decadiene and 1,1,3,3tetramethyldisiloxane Low to medium molecular weight "disiloxanemodified" *n*-paraffines; synthesis and characterization.





Paulo E.A. Ribeiro, Claudio L. Donnici, Eduardo N. dos Santos

J. Organomet. Chem. 691 (2006) 2037

Cationic rhodium(I) complexes containing 4,4'-disubstituted 2,2'-bipyridines: A systematic variation on electron density over the metal centre A series of cationic rhodium(I) complexes containing 4,4'-disubstituted 2,2'-bipyridines were synthesized. The electron density over the metal varies largely with X with virtually no change on its steric environment. The complexes were evaluated on the hydroformylation of terpenes.



Notes

Costa Metallinos, Deanna Tremblay, Fred B. Barrett, Nicholas J. Taylor

J. Organomet. Chem. 691 (2006) 2044

l,1'-Bis(phosphoranylidenamino)ferrocene palladium(II) complexes: An unusual case of dative Fe \rightarrow Pd bonding

Subtle differences in the electron-richness of nitrogen atoms in 1,1'-bis(phosphoranylidenamino)ferrocenes can change the coordination geometry of their palladium(II) complexes from *cis* to *trans. Trans* complexation results in concomitant formation of a relatively short dative Fe–Pd bond of 2.67 Å.



Yong Leng Kelvin Tan, Weng Kee Leong

J. Organomet. Chem. 691 (2006) 2048

Reaction of the heteronuclear cluster $RuOs_3(\mu-H)_2(CO)_{13}$ with toluene

The heteronuclear cluster $RuOs_3(\mu\text{-}H)_2(CO)_{13}$ (4) reacts with refluxing toluene to form the clusters $Ru_2Os_3(\mu\text{-}H)_2(CO)_{16}$ (5) $RuOs_{3-}(CO)_9(\mu\text{-}CO)_2(\eta^6\text{-}C_6H_5Me)$ (6) and $Ru_2Os_{3-}(CO)_{12}(\mu\text{-}CO)(\eta^6\text{-}C_6H_5Me)$ (7). Cluster 5 exists as a mixture of five isomers. The interrelationship among the clusters has also been investigated.



Mohammad El-khateeb, Helmar Görls, Wolfgang Weigand

J. Organomet. Chem. 691 (2006) 2055

Cyclopentadienyl ruthenium alkynyldithiocarboxylate complexes Treatment of the ruthenium chloride, $CpRu(PPh_3)_2Cl$, with $RC\equiv CCS_2^-$, in refluxing THF affords $CpRu(PPh_3)(\kappa^2 S, S-S_2CC\equiv CR)$ (1). The X-ray structure of $CpRu(PPh_3)(\kappa^2 S, S-S_2CC\equiv CBu')$ (1a) was determined. The room temperature reaction of $[CpRu(PPh_3)_2-(NCPh)]^+$, with $RC\equiv CCS_2^-$, produces the chelate complexes 1 and the mono-coordinated complexes $CpRu(PPh_3)_2(\kappa S-S_2CC\equiv CR)$ (2). Complexes 2 are converted to 1 in solution so that they were characterized spectroscopically.

Hyeon Mo Cho, Doo Jin Kang, Myong Euy Lee

J. Organomet. Chem. 691 (2006) 2060

Variable temperature ¹H and ²⁹Si NMR of diastereomeric 1,3-dihydroxy-1,3-bis[(2-dimet-hylaminomethyl)phenyl]-1,3-divinyldisiloxanes

Variable temperature NMR experiments of diastereomeric 1,3-dihydroxy-1,3-bis[(2-dimethylaminomethyl)phenyl]-1,3-divinyldisiloxanes, *meso-***1** and *rac-***1** having intramolecular hydrogen bondings were carried out. As temperature increased, the ¹H NMRs of hydroxy groups of **1** were shifted to a low frequency. Interestingly, the ¹H NMR of two benzylic protons was split more widely ($\Delta \delta = |\delta$ of benzylic H_a- δ of benzylic H_b) as temperature increased.



Malcolm L.H. Green, John B. Leach, Malcolm A. Kelland

J. Organomet. Chem. 691 (2006) 2063

Reactions of small boranes with ruthenium phosphine hydrides: Oligomerisation of monoborane-tetrahydrofuran to a nidohexaruthenaborane Reaction of $[Ru(PPh_3)_4H_2]$ with $BH_3 \cdot$ thf at room temperature gives borane oligomerisation with the formation of *nido*-2- $[Ru(PPh_3)_2$ -(H)B₃H₁₀] (1). This cluster is also formed by reaction of $[Ru(PPh_3)_4H_2]$ with *nido*-B₅H₉. In contrast to $[Ru(PPh_3)_4H_2]$ reaction of [*cis*-Ru(PMe_3)_4H_2] with excess BH₃ · thf gives *nido*-2- $[Ru(PMe_3)_3B_4H_8]$ (3). Reaction of [*cis*-Ru(P-Me_3)_4H_2] with *nido*-B₅H₉ also gives (3) and *nido*-2- $[Ru(PMe_3)_3B_9H_{13}]$ (4).







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