

tolyl), 391 ($M^+ - C_6H_4CO_2Et$), 300 ($M^+ - tolyl - C_6H_4CO_2Et$), 209, 149. IR (neat): 1715 (C=O), 1584, 1387, 1281, 1103, 795, 752 cm^{-1} . Anal. Calcd for $C_{23}H_{23}BiO_2$: C, 51.12; H, 4.29. Found: C, 51.82; H, 4.33.

(4-Acetylphenyl)bis(4-methylphenyl)bismuthane (6f). Colorless crystals. Mp: 101–104 °C. 1H NMR: δ 2.32 (s, 6H), 2.56 (s, 3H), 7.21 (d, $J = 7.6$ Hz, 4H), 7.61 (d, $J = 7.6$ Hz, 4H), 7.83 (d, $J = 6.0$ Hz, 2 H), 7.92 (d, $J = 6.0$ Hz, 2H). FABMS (m/z): 511 ($M^+ + 1$), 419 ($M^+ - tolyl$), 391 ($M^+ - C_6H_4COMe$), 300 ($M^+ - tolyl - C_6H_4COMe$), 209. IR (KBr): 1684 (C=O), 1576, 1485, 1385, 1269, 1184, 1007, 953, 797 cm^{-1} . Anal. Calcd for $C_{22}H_{21}BiO$: C, 51.77; H, 4.15. Found: C, 51.70; H, 4.15.

Reaction of Arylbis(4-methylphenyl)bismuthanes 6b,c with Sulfuryl Chloride. Typical Procedure. To a dichloromethane (10 mL) solution of bismuthane **6b** (0.30 g, 0.44 mmol) was added sulfuryl chloride (0.47 μ L, 0.48 mmol) at -78 °C. As the mixture was warmed gradually to room temperature, the color of the reaction mixture turned yellow. After 1 h, the solvent was removed under reduced pressure to leave dichloride **11** as a yellow solid, which was purified by recrystallization from a mixture of dichloromethane and hexane.

Bis(4-methylphenyl)(1-phenanthryl)bismuth Dichloride (11). Yield: 90%. Mp: 145–147 °C. 1H NMR: δ 2.49

(s, 6H), 7.57 (d, $J = 8.2$ Hz, 4H), 7.6–7.8 (m, 5H), 8.0–8.1 (m, 1H), 8.25 (s, 1H), 8.65 (d, $J = 8.2$ Hz, 4H), 8.7–8.8 (m, 2H). FABMS (m/z): 603 ($M^+ - Cl$), 391 ($M^+ - 2Cl - phenanthryl$), 443, 268, 209. Anal. Calcd for $C_{28}H_{23}BiCl_2$: C, 52.60; H, 3.63. Found: C, 52.23; H, 3.53.

(9-Anthryl)bis(4-methylphenyl)bismuth Dichloride (12). Yield: 88%. Mp: 170–173 °C. 1H NMR: δ 2.49 (s, 6H), 7.4–7.5 (m, 4H), 7.54 (d, $J = 8.5$ Hz, 4H), 8.0–8.1 (2H, m), 8.3–8.4 (m, 2H), 8.62 (s, 1H), 8.65 (d, $J = 8.5$ Hz, 4H). FABMS (m/z): 603 ($M^+ - Cl$), 476 ($M^+ - tolyl - H$), 391 ($M^+ - anthryl$), 268, 212, 209. IR (KBr): 1522, 1473, 1446, 1385, 1266, 1248, 1183, 997, 899, 795, 727 cm^{-1} . Anal. Calcd for $C_{28}H_{23}BiCl_2$: C, 52.60; H, 3.63. Found: C, 52.43; H, 3.50.

Acknowledgment. We acknowledge support of this work by a Grant-in-Aid for Scientific Research (Grant No. 05236101) from the Ministry of Education, Science, Sports, and Culture of Japan. M.M.R. thanks the same for the Fellowship.

OM9701377

Additions and Corrections

1996, Volume 15

Tetsuo Ohta, Yoichi Tonomura, Kyoko Nozaki, Hidemasa Takaya, and Kazushi Mashima*: An Anionic Dinuclear BINAP–Ruthenium(II) Complex: Crystal Structure of $[NH_2Et_2]\{[RuCl((R)-p-MeO-BINAP)]_2(\mu-Cl)_3\}$ and Its Use in Asymmetric Hydrogenation.

Pages 1522–1523. An improper computer operation caused wrong calculations of bond distances and angles of complex (*R*)-**2**. Selected bond lengths (Å) and angles (deg) in the caption to Figure 1 are corrected as follows: Ru–Cl(1) = 2.437(3), Ru–Cl(2) = 2.423(3), Ru–Cl(3) = 2.493(3), Ru–Cl(3*) = 2.518(3), Ru–P(1) = 2.271(3), Ru–P(2) = 2.269(3); Cl(1)–Ru–Cl(2) = 163.9(1), Cl(1)–Ru–Cl(3) = 79.8(1), Cl(1)–Ru–Cl(3*) = 79.3(1), Cl(2)–Ru–Cl(3) = 87.6(1), Cl(2)–Ru–Cl(3*) = 88.7(1), Cl(3)–Ru–Cl(3*) = 80.5(1), Cl(1)–Ru–P(1) = 96.0(1), Cl(1)–Ru–P(2) = 103.5(1), Cl(2)–Ru–P(1) = 94.8(1), Cl(2)–Ru–P(2) = 88.0(1), Cl(3)–Ru–P(1) = 94.0(1), Cl(3)–Ru–P(2) = 173.0(1), Cl(3*)–Ru–P(1) = 173.3(1), Cl(3*)–Ru–P(2) = 94.0(1), P(1)–Ru–P(2) = 91.8(1). The dihedral angle between the two naphthyl planes of **2** was 70.7°.

Supporting Information Available: Corrected tables for the crystallographic study of compound (*R*)-**2** (21 pages). Ordering information is given on any current masthead page.

OM970421Y