

# Synthesis and structures of two ruthenium dibenzoylmethane triphenylphosphine mixed ligand complexes

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**Abstract:** The reaction of dibenzoylmethane (HDBM) with  $[\text{RuCl}_2(\text{PPh}_3)_3]$  in benzene in the presence of a supporting base ( $\text{Et}_3\text{N}$ ) under reflux gives two different complexes, the side product as a green-yellow Ru(III) compound of composition  $[\text{Ru}^{\text{III}}\text{Cl}_2(\text{DBM})(\text{PPh}_3)_2]$  (2) and the main product as a red Ru(II) complex of composition  $[\text{Ru}^{\text{II}}(\text{DBM})_2(\text{PPh}_3)_2]$  (3). The products were studied by spectroscopic methods, cyclic voltammetry and X-ray single crystal diffraction. The molecular structure of 2 shows a distorted octahedral environment around the Ru atom with two phosphine ligands in trans positions. The octahedral complex 3 shows a cis arrangement of two phosphine ligands. © 2009 Springer Science+Business Media B.V.

**Index Keywords:** Cis arrangement; Dibenzoylmethane; Mixed ligand complexes; Octahedral complex; Octahedral environment; Phosphine ligands; Ru complexes; Side products; Spectroscopic method; Triphenyl phosphines; X-ray single-crystal diffraction; Benzene; Chelation; Complexation; Crystal atomic structure; Cyclic voltammetry; Ligands; Phosphorus compounds; Ruthenium; Single crystals; Spectroscopic analysis; Synthesis (chemical); Ruthenium compounds

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## References:

- Grunwald, C., Laubender, M., Wolf, J., Werner, H., (1998) *J Chem Soc, Dalton Trans Inorg Chem*, 5, pp. 833-839. , 10.1039/a707870f
- Paul, B.C., Poddar, R.K., (1993) *Trans Met Chem*, 18, pp. 96-100. , 10.1007/BF00136061 1:CAS:528:DyaK3sXktl2gtLY%3D
- Farrell, N., De Almeida, S.G., (1983) *Inorg Chim Acta*, 77, pp. 111-L112. , 10.1016/S0020-1693(00)82583-9 1:CAS:528:DyaL3sXls1ygu7w%3D
- Natarajan, K., Poddar, R.K., Agarwala, U., (1977) *J Inorg Nucl Chem*, 39, pp. 431-435. , 10.1016/0022-1902(77)80056-0 1:CAS:528:DyaE2sXks1WrtrY%3D
- Bennett, M.A., Chung, G., Hockless, D.C.R., Neumann, H., Willis, A.C., (1999) *J Chem Soc Dalton Trans Inorg Chem*, 19, pp. 3451-3462. , 10.1039/a905492h
- Shiu, K.-B., Jean, S.-W., Wang, Y., Lee, G.-H., Reactions of the cationic diruthenium carbonyl complex  $[Ru_2(\mu-dppm)_2(CO)_4(\mu,\eta^2-O_2CMe)]^+$  Intramolecularly assisted stereospecific synthesis via the second-sphere face-to-face  $\pi$ - $\pi$  stacking interactions (2002) *Journal of Organometallic Chemistry*, 650 (1-2), pp. 268-273. , DOI 10.1016/S0022-328X(02)01198-1, PII S0022328X02011981
- Martin, M., Sola, E., Lahoz, F.J., Oro, L.A., (2002) *Organometallics*, 21, pp. 4027-4029. , 10.1021/om0205243 1:CAS:528:DC%2BD38Xms1Wmt7c%3D
- Brown, J.M., Brunner, H., Leitner, W., Rose, M., (1991) *Tetrahedron: Asym*, 2, pp. 331-334. , 10.1016/S0957-4166(00)82111-4 1:CAS:528:DyaK3MXlvVamuro%3D
- Mishra, L., Yadaw, A.K., Phadke, R.S., Choi, C.S., Araki, K., (2001) *Metal-Based Drugs*, 8, pp. 65-671. , 10.1155/MBD.2001.65 1:CAS:528:DC%2BD3MXlt1KqtLY%3D
- Mishra, L., Sinha, R., Itokawa, H., Bastow, K.F., Tachibana, Y., Nakanishi, Y., Kilgore, N., Lee, K.-H., Anti-HIV and cytotoxic activities of Ru(II)/Ru(III) polypyridyl complexes containing 2,6-(2'-benzimidazolyl)-pyridine/chalcone as co-ligand (2001) *Bioorganic and Medicinal Chemistry*, 9 (7), pp. 1667-1671. , DOI 10.1016/S0968-0896(01)00074-8, PII S0968089601000748
- Bennett, M.A., Byrnes, M.J., Willis, A.C., Bis(acetylacetonato)ruthenium(ii) complexes containing alkynylidiphenylphosphines. Formation and redox behaviour of  $[Ru(acac)_2(Ph_2PCCR)_2]$  (R = H, Me, Ph) complexes and the binuclear complex  $cis-[Ru(acac)_2]_2(-Ph_2PCCPh_2)_2]$  (2007) *Dalton Transactions*, (17), pp. 1677-1686. , DOI 10.1039/b618365d
- Bennett, M.A., Byrnes, M.J., Chung, G., Edwards, A.J., Willis, A.C., Bis(acetylacetonato)ruthenium(II) complexes containing bulky tertiary phosphines. Formation and redox behaviour of  $Ru(acac)_2(PR_3)$  (R = iPr, Cy) complexes with ethene, carbon monoxide, and bridging dinitrogen (2005) *Inorganica Chimica Acta*, 358 (5 SPEC. ISS.), pp. 1692-1708. , DOI 10.1016/j.ica.2004.07.062
- Smejkal, T., Breit, B., Self-assembled bidentate ligands for ruthenium-catalyzed hydration of nitriles (2007) *Organometallics*, 26 (9), pp. 2461-2464. , DOI 10.1021/om0611047
- Manimaran, T., Wu, T.C., Klobucar, W.D., Kolich, C.H., Stahly, G.P., Fronczek, F.R., Watkins, S.E., (1993) *Organometallics*, 12, pp. 1467-1470. , 10.1021/om00028a078 1:CAS:528:DyaK3sXitlemtr0%3D
- Oshiki, T., Yamashita, H., Sawada, K., Utsunomiya, M., Takahashi, K., Takai, K., Dramatic rate acceleration by a diphenyl-2-pyridylphosphine ligand in the hydration of nitriles catalyzed by  $Ru(acac)_2$  complexes (2005) *Organometallics*, 24 (26), pp. 6287-6290. , DOI 10.1021/om050792b
- Gnanasoundari, V.G., Natarajan, K., Synthesis, characterization and catalytic studies of iron(III), cobalt(II), nickel(II) and copper(II) complexes containing triphenylphosphine and  $\beta$ -diketones (2005) *Transition Metal Chemistry*, 30 (4), pp. 433-438. , DOI 10.1007/s11243-005-1023-4

- Colson, S.F., Robinson, S.D., (1989) *Polyhedron*, 8, pp. 2179-2182. , 10.1016/S0277-5387(00)80353-8  
1:CAS:528:DyaK3cXhtlWjuro%3D
- Ortiz-Frade, L.A., Ruiz-Ramirez, L., Gonzalez, I., Marin-Becerra, A., Alcarazo, M., Alvarado-Rodriguez, J.G., Moreno-Esparza, R., (2003) *Inorganic Chemistry*, 42, pp. 1825-1834. , 10.1021/ic025849q 1:CAS:528:DC%2BD3sXht1Sgt74%3D
- Sheldrick, G.M., (1997) *SHELXS-97 and SHELXL-97 Programs for the Solution and Refinement of Crystal Structures*, , University of Göttingen Göttingen
- Nakamoto, K., (2009) *Infrared and Raman Spectra of Inorganic and Coordination Compounds*, , Wiley New Jersey
- Johnson, C.K., (2000) *ORTEP, Fortran Thermal Ellipsoid Plot Program*, , Oak Ridge National Laboratory, Oak Ridge
- Colson, S.F., Robinson, S.D., Robinson, P.D., Hinckley, C.C., (1989) *Acta Cryst Sec C*, 45, pp. 715-718. , 10.1107/S010827018801340X 1:CAS:528:DyaL1MXks1ygt78%3D