



SYNTHESIS OF PALLADIUM(II) DIIMINE COMPLEXES AND THE HYDROLYSIS OF α -DIIMINE LIGAND

(Sintesis Kompleks Diimina Palladium(II) dan Hidrolisis Ligan α -Diimina)

Suzie Hui Chin Kuan^{1*}, Meng Guan Tay¹, Zhi-Qiang Liu²

¹Faculty of Resource Science and Technology,
Universiti Malaysia Sarawak, 94300 Kota Samarahan, Malaysia

²State Key Lab of Crystal Materials,
Shandong University, 27 Shanda South Road, Jinan, 250100, China

*Corresponding author: suzie_kuan0807@hotmail.com

Received: 23 May 2019; Accepted: 28 August 2019

Abstract

The reactions of dichlorobis(acetonitrile)palladium(II) precursors with 1,4-diaza-1,3-butadienes (α -diimine) give rise to the products (1,4-bis(4-methoxyphenyl)-1,4-diaza-1,3-butadiene)dichloropalladium(II) (**2a**) and (1,4-bis(4-methylphenyl)-1,4-diaza-1,3-butadiene)dichloropalladium(II) (**2b**), as deduced from elemental analysis, FTIR, and UV-Vis. Both complexes are soluble in dimethylformamide and single crystals were collected for an X-ray crystallographic study. Based on the crystallographic data, complex **2a** is crystalized in a monoclinic system with P2₁/c space group. The Pd-N bond lengths for Pd01-N004 and Pd01-N005 are 2.045(2) and 2.033(2) Å, respectively. Surprisingly, when complex **2b** dissolved in dimethylformamide, 4-methylaniline was produced from the hydrolysis of the α -diimine ligand **1b**, therefore *trans*-dichloridobis(4-methylaniline- κ N)-palladium(II) (**2c**) was formed as confirmed, by crystallographic data. Complex **2c** is crystallized in a triclinic system with P 2₁/b 2₁/c 2₁/a (Pbca) space group. The bond lengths of Pd-N are 2.050(3) Å and Pd-Cl is 2.318(8) Å. There are weak intermolecular N-H...Cl hydrogen bonds, that are responsible for the packing of the molecules in formation.

Keywords: 1,4-diaza-1,3-butadienes, palladium diimine complex, X-ray crystal, hydrolysis, hydrogen bonds

Abstrak

Tindak balas diklorobis(asetonitril)palladium(II) prakursor dengan 1,4-diaza-1,3-butadiena menghasilkan produk sebagai (1,4-bis(4-metoksifenil)-1,4-diaza-1,3-butadiena)dikloropalladium(II) atau 4-bis(4-metilfenil)-1,4-diaza-1,3-butadiena)dikloro palladium(II) yang disimpulkan daripada analisis unsur, FTIR, dan UV-Vis. Kedua-dua kompleks ini larut dalam dimetilformamida dan hablur tunggal telah dikumpulkan untuk kajian kristalografi sinar-X. Berdasarkan data kristalografi, kompleks **2a** mengablur dalam sistem monoklinik dengan kumpulan ruang P2₁/c. Panjang ikatan Pd-N ialah 2.045 (2) untuk Pd01-N004 dan 2.033 (2) Å untuk Pd01-N005. Walau bagaimanapun, apabila kompleks **2b** larut dalam dimetilformamida, 4-metilanilina telah dihasilkan dari hidrolisis ligan α -diimine **1b**, oleh itu, *trans*-dikloridobis(4-metilanilina- κ N)-palladium(II) (**2c**) telah terbentuk seperti yang dibuktikan oleh data hablur. Kompleks **2c** mengablur dalam sistem triklinik dengan kumpulan ruang P 2₁/b 2₁/c 2₁/a (Pbca). Panjang ikatan Pd-N ialah 2.050 (3) Å dan Pd-Cl ialah 2.318 (8) Å. Terdapat ikatan intermolekul yang lemah N-H...Cl yang bertanggungjawab untuk pepadatan molekul.

Kata kunci: 1,4-diaza-1,3-butadiena, kompleks diimina palladium, hablur sinar-X, hidrolisis, ikatan hidrogen