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# P1

## Cyclization of coordinated diazoalkane to alkene and alkyne to afford *3H*-pyrazole derivatives

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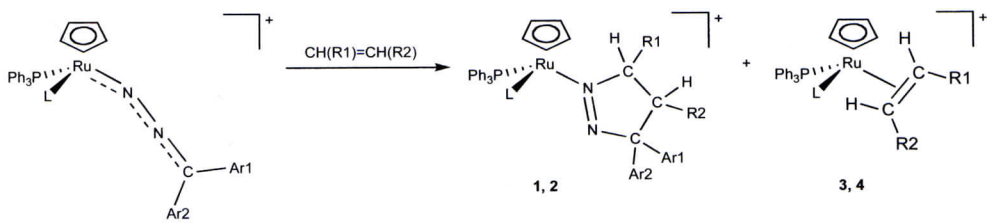
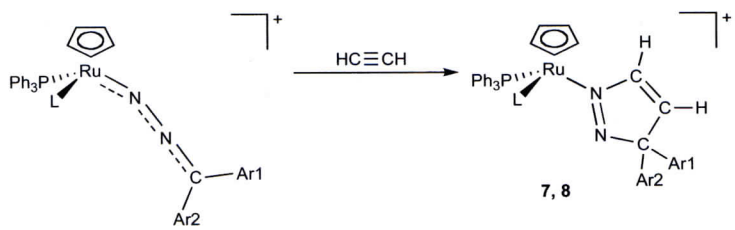
Diazoalkane complexes $Ru(\eta^5\text{-}C_5H_5)(N_2CAr1Ar2)(PPh_3)L$ react with ethylene under mild conditions (1 atm, RT) to give not only small amounts of ethylene complexes $[Ru(\eta^5\text{-}C_5H_5)(\eta^2\text{-}CH_2{=}CH_2)(PPh_3)L]BPh_4$ (**3, 4**), but also the novel derivatives $[Ru(\eta^5\text{-}C_5H_5)\{\eta^1\text{-}N{=}NC(Ar1Ar2)CH_2CH_2\}(PPh_3)L]BPh_4$ (**1, 2**). The reaction proceeds with (3+2) cycloaddition of ethene to the coordinated diazoalkane, giving dihydro-*3H*-pyrazole derivatives **1, 2**. Activated alkenes R1CH=CHR2 also react with diazoalkane complexes, leading to the corresponding dihydro-*3H*-pyrazole derivatives.




L = $P(OMe)_3$, $P(OEt)_3$; Ar1 = Ph, Ar2 = *p*-tolyl; Ar1Ar2 = $C_{12}H_8$; R1 = H, R2 = CN; R1 = R2 = CN; R1R2 = OC–O–CO; R1R2 = $C_5H_6$

Instead, treatment of diazoalkane complexes with propylene under pressure (7 atm, RT) gives exclusively substitution of the diazoalkane, with formation of the propylene complexes $[Ru(\eta^5\text{-}C_5H_5)(\eta^2\text{-}CH_3CH{=}CH_2)(PPh_3)L]BPh_4$ (**5, 6**).

Dipolar (3+2) cycloaddition of coordinated diazoalkane to ethyne HC≡CH under mild conditions was also observed, yielding the *3H*-pyrazole derivatives $[Ru(\eta^5\text{-}C_5H_5)\{\eta^1\text{-}N{=}NC(Ar1Ar2)CH{=}CH\}(PPh_3)L]BPh_4$ (**7, 8**).




All the complexes were characterized spectroscopically and by X-ray crystal structure determination of compounds **1**, **5** and **7**.

G. Albertin et al., *Organometallics* 32 (2013) 1357.