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Reversible thermal carbon-hydrogen bond cleavage in alkanes and arenes with dihalogenobis(triphenylphosphine)palladium(II) complexes

Vedernikov A., Kuramshin A., Solomonov B.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

Dihalogenobis(triphenylphosphine)palladium(II) complexes 1, $\text{PdX}_2(\text{PPh}_3)_2$ ($X = \text{Cl}, \text{Br}, \text{I}$), reacts reversibly with saturated and aromatic hydrocarbons RH (RH = p-xylene, toluene, benzene, n-hexane, cyclohexane), slowly at ambient temperature and rapidly on heating at 70-130°C, to produce hydridodihalogeno(organo)bis(triphenylphosphine)-palladium(IV) complexes 2, $\text{Pd}(\text{H})(\text{R})\text{X}_2(\text{PPh}_3)_2$; in the presence of bases complexes 2 eliminate hydrogen halide forming organobis(triphenylphosphine)palladium(II) halide 3, $\text{Pd}(\text{R})\text{X}(\text{PPh}_3)_2$.

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