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2-Hydroxyarylphosphines: Ligand Tailoring for Homogenous Nickel Catalyzed Poly- and Oligomerization of Ethene

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2-HYDROXYARYLPHOSPHINES: LIGAND TAYLORING FOR HOMOGENOUS NICKEL CATALYZED POLY- AND OLIGOMERIZATION OF ETHENE

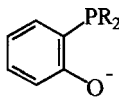
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Ni(COD)₂ reacts with tertiary, secondary, and even some primary 2-hydroxyarylphosphines to form catalysts for the polymerization of ethene. The conversion and molecular weight distribution depend strongly on steric and electronic effects, particularly on the other substituents at phosphorus (Table I) as well as on solvents and auxiliaries. Increasing *P*-basicity favors, increasing steric demand of *P*-substituents

TABLE I

	Cy	<i>i</i> Pr	Et	<i>t</i> Bu	Ph
Conversion (%) ^a	72	40	84	94	66
M _w (g/mol)	58,930	25,840	21,810	14,020	5,510
M _n (g/mol)	26,500	6,230	7,943	2,330	4,430
Conversion (%) ^b	50.4	59	98*	25	
M _w (g/mol)	97,490	38,400	25,140*	29,920	
M _n (g/mol)	32,040	13,100	9,226*	7,274	

^a50 bar/100°C.

^b30 bar/70°C.

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diminishes the chain growth as compared to chain transfer or termination. *P*-primary derivatives give catalysts when the ligands are activated/protected by 4-OMe or 4,6-*t*Bu₂ substituents. Addition of suitable R₃P to the Ph₂PC₆H₄/O⁻/Ni catalysts causes oligomerization of C₂H₄ in high yield.