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Research Paper

Novel titanium(IV) complexes stabilized by 2-hydroxybenzyl alcohol derivatives as catalysts for UHMWPE production

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ABSTRACT *A series of titanium (IV) complexes (**2, 5-7**) stabilized by a substituted 2-hydroxybenzyl alcohols (**1, 4**) – were synthesized. Structures of complexes **6-7** were determined by X-ray diffraction. Titanium atom in the tetrameric complex **6** has an octahedral environment created by chlorine atom and five oxygen atoms. The main structural feature of **7** is a centrosymmetric Ti_4O_6 cage which is built of two seco-norcubanes Ti_4O_3 sharing a common Ti_2O_2-face. A coordination polyhedron around the titanium atoms is the distorted octahedron, with the long Ti─μ-O and short Ti─O bonds. All resulting complexes are moderately or highly active in ethylene polymerization in the presence of {$3Et_2AlCl$ + Bu_2Mg} binary co-catalyst. Resulting polymers are linear ultrahigh molecular weight polyethylenes (up to 7.9 10^6 g/mole). Polymers are suitable for the modern processing methods – the solvent-free solid state formation of super high-strength (tensile strength over 2.0 – 2.4 GPa) and high-modulus (elastic modulus up to 130 GPa) oriented film tapes.*