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Jun-Ichi Kadokawa^a; Hideyuki Tagaya^a

^a Yamagata University, Japan

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CONDENSING AGENT CONSISTING OF TRISUBSTITUTED PHOSPHINE/TETRAHALOMETHANE/BASE SYSTEM FOR DIRECT POLYCONDENSATION USING CO₂ AS A MONOMER

Jun-Ichi Kadokawa and Hideyuki Tagaya
Yamagata University, Japan

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Polycarbonate, a fundamental polymer in the field of materials science, is generally prepared by polycondensation of a dihydroxy compound such as bisphenol A with phosgene, a highly toxic agent. The direct synthesis of polycarbonates from CO₂ and diols had not been reported. Recently, we discovered the new polycondensation reaction of CO₂ with *p*- and *m*-xylylene glycols using tributylphosphine/*N*-cyclohexyl-*N'*,*N'*,*N''*,*N''*-tetramethylguanidine (CyTMG) system as the condensing agent, which is the first direct synthesis of polycarbonates from CO₂ and diols.¹ This condensing agent, however, was not effective for the polycondensation of CO₂ with other diol compounds; this is probably due to the lower reactivity of the hydroxy groups compared with the benzylic hydroxy groups of xylylene glycols. Attempts to develop a new condensing agent which is generally applicable to the direct synthesis of polycarbonates from CO₂ and diols, resulted a combination of triphenylphosphine, bromotrichloromethane, and CyTMG. This worked well as the condensing agent for the polycondensation of CO₂ with various diols, giving rise to the corresponding polycarbonates.²

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Address correspondence to Jun-Ichi Kadokawa, Department of Materials Chemistry, Graduate School of Engineering, Tohoku University, Sendai 980-8579, Japan. E-mail: kadokawa@poly.che.tohoku.ac.jp