

Driving dimethyl carbonate synthesis from CO₂ and methanol and production of acetylene simultaneously using CaC₂

Zhaofu Zhang,^{*a} Shuaishuai Liu,^{ab} Lujun Zhang,^{ab} Shuai Yin,^{ab} Guanying Yang^{ab} and Buxing Han^{*ab}

Experimental Section

CaC₂ (72-82%) was purchased from Acros. It was grinded down into flour (140 mesh) using ball mill before used. Di-n-butyltin oxide was purchased from Lancaster. CO₂ with a purity of 99.99% was obtained from Beijing Analytical Instrument Factory. Other chemicals were provided by Sinopharm Chemical Reagent Co., Ltd.

In a typical experiment, 2.0 g methanol was added into a Teflon-lined stainless steel reactor of 15 mL with a magnetic stirrer. Certain amounts of CaC₂, methanol and catalyst were added into the reactor. The reactor was placed in an air bath of 60 °C and stirring for one hour, the reactor was cooled in ice water and acetylene was released slowly. Then the reactor was placed in an air bath of desired temperature, and CO₂ was charged to 15 MPa. The reaction proceeded under stirring. After a certain reaction time, the reactor was cooled in water to stop the reaction. The liquid was analyzed quantitatively by GC (Agilent 6820) equipped with a flame ionization detector (FID) and a DB-5 capillary column. 1-Butanol was used as external standard.