Supplementary Information

First application of Supported Ionic Liquid Phase (SILP) catalysis for continuous methanol carbonylation

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Gas-phase methanol carbonylation with SILP [BMIM][$Rh(CO)_2I_2$]-[BMIM]I-SiO_2 catalyst

Continuous, gas-phase carbonylations of methanol with carbon monoxide gas and methyl iodide co-catalyst were performed in an all-heated stainless steel (AISI 316Ti) catalyst test system with the SILP catalyst positioned as a fixed-bed in a tubular reactor, placed in a temperature controlled aluminum block oven. The temperature inside the reactor was measured (± 0.1 ºC) by an internally positioned thermocouple (Inconel® 600, Omega) placed ca. 0.5 cm above the catalyst bed. The catalytic test system allowed the reactant feed composition of CO gas (99.97 %, Strandmoellen Lab) and liquid methanol-methyl iodide mixture (MeOH: ≥ 99.9 %, Aldrich, dried with 3 Å molecular sieves; MeI: ≥ 99.5 %, Fluka) to be carefully regulated *via* the flows (i.e. F_{CO} and F_{liq}) using gas- and liquid mass-flow controllers (Hi-Tec, Bronkhorst), respectively, integrated with an evaporator and mixing unit (Hi-Tec CEM unit, Bronkhorst). Additionally, the reaction pressure was controlled by a regulation loop consisting of a pneumatic back-pressure regulator valve (Microvalve 3510, Samson), an electronic controller (Trovis 6493) and a pressure transducer (Wika S-11). Gas-phase products and unreacted reactants were analyzed periodically by an integrated on-line FID-GC (Perkin Elmer Autosystem XL, Nukol capillary column, 15 m × 0.53 mm ID, Supelco Inc.) using auto gas sampling. The FID-GC analysis allowed determination of methanol conversion and catalyst activity (as turn-over-frequency as mol product formed per mol rhodium per hour) and the product selectivity.