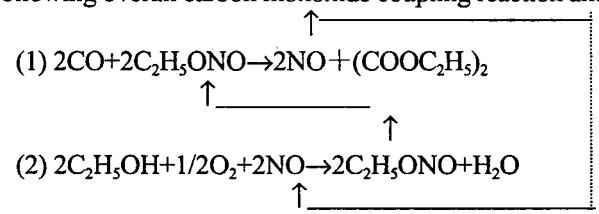
Study on Atom Economic Process of Diethyl Oxalate Synthesis by CO Coupling in Gaseous Phase

WANG Bao-Wei, MA Xin-Bin, XU Gen-Hui
(State Key Lab of C_1 Chem. Tech., Tianjin University, Tianjin 300072)

The gaseous phase syntheses of diethyl oxalate and oxalic acid from CO are an important project of C_1 chemical technology[1]. Oxygencontent of CO is as high as 57%(wt) and its source is abundant. It is best of all economical and reasonable that oxy-compound is synthesized with carbon monoxide. In particular the reaction of CO coupling reaction can take place under moderate reaction conditions with low consumption of energy to produce oxalic acid and diethyl oxalate, which are feed stocks for ethylene glycol syntheses by the hydrogenation of oxalate, as well as for products such as pesticides, pharmaceuticals, foodstuffs, polymers, and fine chemicals.

The present work was carried out in a fixed-tube flow circulation reactor, involving the study of the following overall carbon monoxide coupling reaction and regeneration reaction.



The technology of gaseous ethyl nitrite promoted CO coupling is very efficient. In comparison with other technologies this process has favorable economics, without environmental pollution. It is an atom economy green chemical new technology.

The kinetics and reaction mechanisms were studied. The results indicated that the CO coupling reaction was L-H model reaction and the regeneration of ethyl nitrite was quickly one order power reaction. The influences of carries, loading of active component in catalyst, amounts of promoter and the temperature of calcining carries on the activity of the supported dimetal catalysts Pd-Me/Al_2O_3 were investigated. The preparations of catalyst were amplified 200 times, and the reaction was significantly tested in scale up experiment for continuous running 1000 hours. The influence of the inlet gases concentration, coupling reactive temperature, reaction pressure on the reaction behavior was studied. The results indicated that the selectivity of CO was over 95% and the STY of catalytic reaction was above 500g/cat.L.h. The self-closing, non-waste, clean catalytic technology was set up according to these results.

Reference

1 Agullo A., Alder J.S., Freemcm D.N, et al.. Focus on C_1 Chemistry, C_1 Chemistry, 1983, **62**:57