**Catalyst cycling in the oscillatory phenylacetylene carbonylation reaction**

Oxidative carbonylation reactions are important C-C bond forming reactions that generate a number of products depending on the substrates, catalyst and reaction conditions.1-7 Using a PdI2-KI catalyst with alkynes under mild conditions good catalytic efficiencies have been achieved leading to a mixture of dicarbonylation products.8 Interestingly, when phenylacetylene (PhAc) was employed as the substrate in methanol, oscillations in pH, redox potential, gas uptake (CO and O2), reaction heat (Qr) and turbidity were discovered.9-17 Using data from isothermal experiments which monitored pH, turbidity and product formation in this system a reaction pathway is postulated. Kinetic versus thermodynamic control is explored by examining the effect of temperature on product formation. Turbidity, pH and the heat released within a single oscillation is used to propose catalyst cycling responsible for the oscillatory nature of this carbonylation process.

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