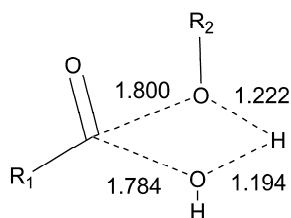


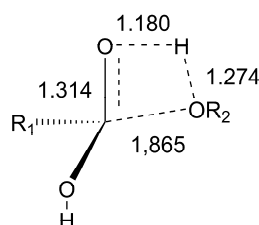
## Electronic Supplementary Information

### Key Bond Lengths of Transition States

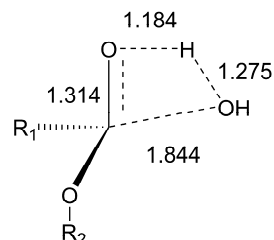
TsA



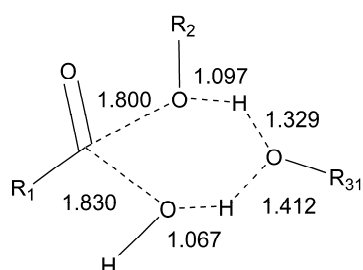
TsB1



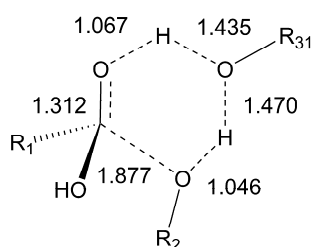
TsB2



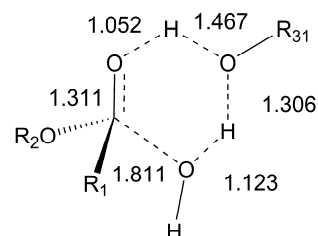
TSc1



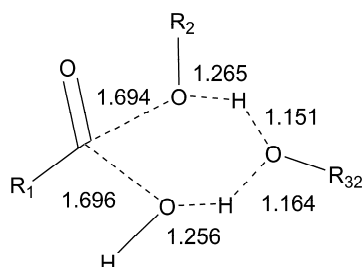
TSd11



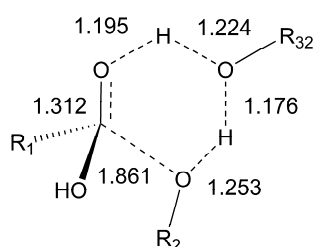
TSd12



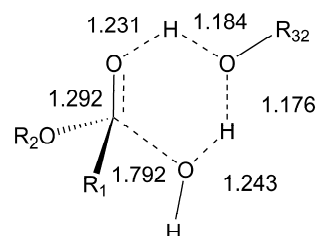
TSc2



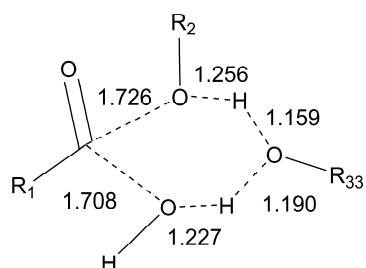
TSd21



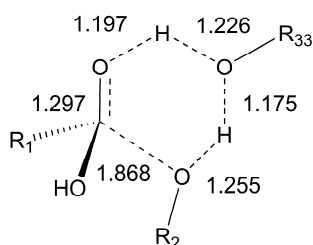
TSd22



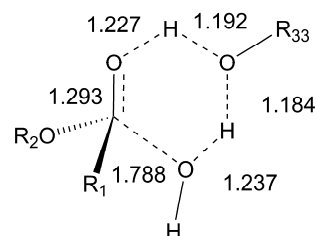
TSc3



TSd31

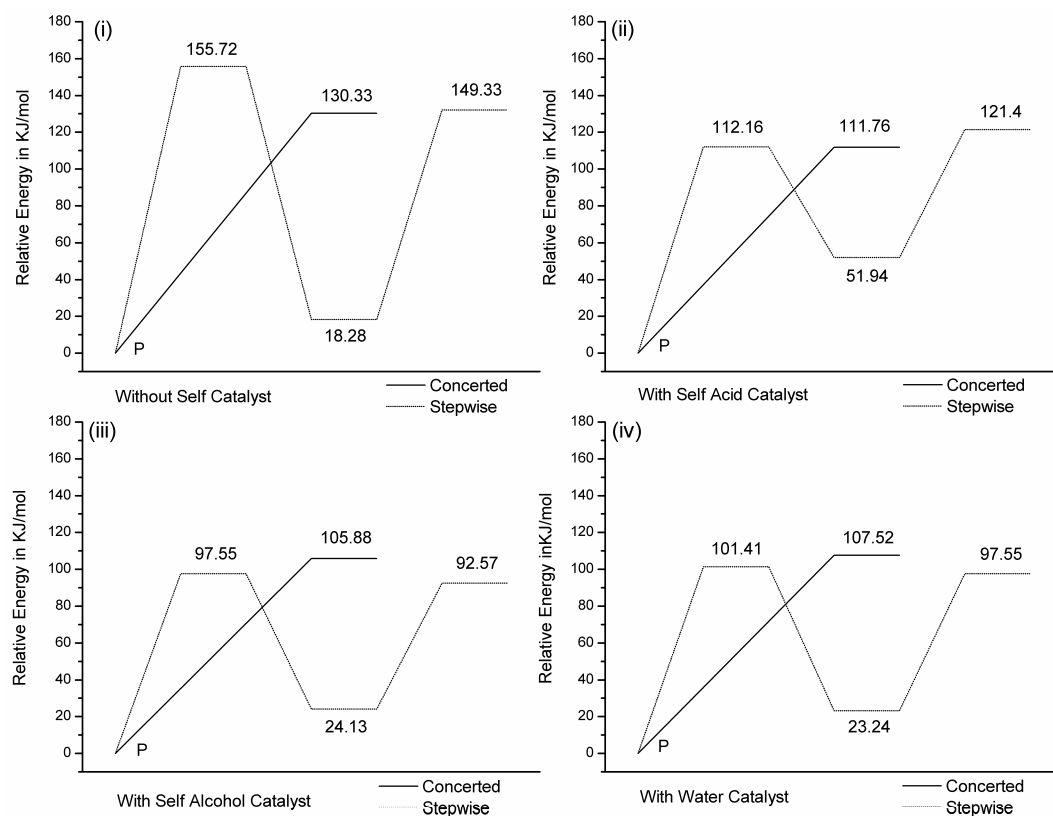


TSd32



The unit of bond lengths is Å.

## Potential Energy Profiles of Four Reverse Channels



(i) In the absence of self catalyst. (ii) In the present of self acid catalyst. (iii) In the presence of self alcohol. (iv) In the presence of water catalyst. Solid line: concerted. Dotted line: stepwise.