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**The Reaction of Crotonic Anhydride with Scots and Corsican Pine:
Investigation of Kinetic Profiles and Determination of Activation Energies**

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Abstract: The kinetics of the reaction of crotonic anhydride with Scots pine (*Pinus sylvestris*) and Corsican pine (*Pinus nigra*) using pyridine as catalyst/solvent was investigated and activation energies for the initial reaction determined. Activation energies were calculated from the Arrhenius equation using rate data obtained from time-course experiments repeated at several temperatures. In one method, reaction constants (k) were determined experimentally, while in the other method initial rates were extrapolated at time zero. With the rate constant method, activation energy values for Scots and Corsican pine were calculated as $39.0 (\pm 5.8)$ and $30.3 (\pm 6.8)$ kJ mol⁻¹, respectively. The method of initial rate was also used to determine activation energy. Activation energies of $41.3 (\pm 7.0)$ and $26.9 (\pm 4.0)$ kJ mol⁻¹ were obtained for Scots and Corsican pine, respectively. There was no significant difference between the activation energies determined by the two methods. The initial reaction was observed to follow pseudo first-order-kinetics. A difference of ca. 10 kJ mol⁻¹ between the activation energies was found between the two wood species. The reason for this difference is not known. This information is of fundamental importance when considering such issues as mechanisms of reaction, or designing efficient large scale processes.

Key Words: Activation energies, rate constant, initial rate, chemical modification

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