

Abstract for Oral Presentation: *p*-Cymenesulphonyl Chloride: A Citrus Waste Derived Activating Group and Protecting Group for Greener Organic Synthesis

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An essential part of synthetic chemistry, activating groups and protecting groups are often used in more than one molar equivalent to the substrate, thus accounting for a significant share of the total amount of reagents used. Tosyl chloride is one such reagent. It is widely used as a protecting group,¹ or an activating group,² for alcohols and amines in the synthesis of complex molecules. Within the 12 principles of green chemistry it is explicitly stated that "unnecessary derivatization should be minimized or avoided if possible, because such steps require additional reagents and can generate waste" (principle 8).³ However progress in achieving this goal has been slow and limited to specific examples,⁴ and there will likely always be a need for protecting and activating groups in some areas of synthetic organic chemistry. It would be of considerable benefit, if maybe as just an intermediate step towards the eventual elimination of activating and protecting groups, to obtain these chemicals from a renewable source instead of petroleum (coinciding with principle 7).

Research at the Green Chemistry Centre of Excellence, University of York, UK, has shown that a bio-derived protecting/activating group can be synthesized by introducing a sulphonyl chloride group to the aromatic ring of *p*-cymene derived from citrus peel waste.⁵ The resulting *p*-cymenesulphonyl chloride was evaluated as an activating group by reacting with 1-octanol, 2-octanol, phenol and piperidine, and further reactions of the activated alcohols. The comparison to tosyl chloride demonstrates that the bio-based alternative can be effectively utilised as a direct replacement for the current fossil derived equivalent.

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