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## Transition Metal-Free Hydroformylation Through A Combined Radical-Ionic Process

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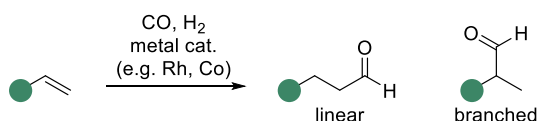
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Keywords: Hydroformylation, photocatalysis, organophosphorus chemistry

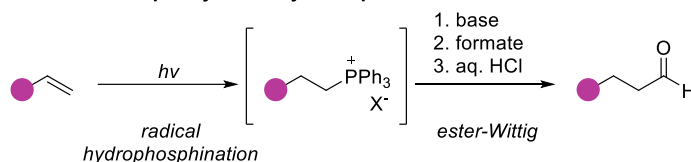
### ABSTRACT

Hydroformylation represents one of the most widely applied examples of homogeneous catalysis in the chemical industry. Typically, it is performed with a transition metal catalyst (such as cobalt or rhodium) under high pressures of carbon monoxide and hydrogen (syngas) with an alkene, resulting in the formation of aldehydes. Despite its industrial importance, its application in academic research is limited as a result of the specialist equipment required to handle syngas at high pressure. Furthermore, the regioselectivity of addition can be difficult to control, with both linear and branched isomers being produced.<sup>1</sup> Our transition-metal free variant is based upon the combination of a photochemical method for the synthesis of phosphonium salts from alkenes followed by a Wittig reaction with a formate ester. This results in a simple and convenient one pot method for the synthesis of aldehydes from alkenes with exclusive linear selectivity. The work will describe the optimisation and scope of this process.

#### Classical hydroformylation procedure



#### This work: One-pot hydroformylation procedure



### ACKNOWLEDGEMENTS

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### REFERENCES

1. Franke, R.; Selent, D.; Börner, A.; Applied Hydroformylation, *Chemical Reviews*, **2012**, 112 (11), 5675-5732, DOI: 10.1021/cr3001803