ALKANE FUNCTIONALIZATION: A PROMISING APPROACH FOR ORGANIC SYNTHESIS?

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In spite of being the major components of natural gas and oil, and a highly rich natural carbon source, alkanes have been applied mainly as non-renewable fossil fuels where they are burnt and carbon is lost to the atmosphere (as carbon dioxide) with serious environmental problems.

Although the inertness of alkanes has hampered their use as a feedstock for organic synthesis, their functionalization to products with an added value has already been achieved, in some cases under moderate or mild conditions, by using suitable metal catalytic systems. However, such an overall approach for organic synthesis still remains underexplored and concerns one of the greatest challenges in modern chemistry.

The inertia of alkanes usually requires the use of harsh reaction conditions and results in low product yields and selectivities. These limitations should be overcome by finding sufficiently active, selective and sustainable catalytic systems involving the selective activation of some of the alkane carbon-hydrogen (or - carbon) bonds. This perspective for organic synthesis would be highly advantageous even in terms of simplicity, in comparison with the current multi-stage and often energy demanding industrial processes for such organic products.[1-3]

The results obtained in the authors laboratory towards mainly the sustainable syntheses of alcohols, ketones and carboxylic acids, are summarized herein.[4,5]

References (recent book and chapters):
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Acknowledgements: This work has been partially supported by the Fundação para a Ciência e Tecnologia (projects PTDC/QEQ-QIN/3967/2014 and UID/QUI/00100/2019). The co-authors cited in the references are gratefully acknowledged.