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PhD Studentships in Organic Chemistry, University of York, UK

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Free radicals in phenylene diamine oxidation

What is common between colour photography and hair dyeing? Both processes involve essentially the same chemistry based on indo dyes [1,2]. The dyes in both cases are formed in situ by oxidative coupling of phenylene diamines with aromatic compounds, a reaction which proceeds via formation of relatively stable free radical intermediates. Although indo dyes have been around for decades, the mechanistic chemistry of their formation lacks many details which are essential for development of better, less harmful dyes.

This project aims to unravel the mechanism of hair dyeing and related reactions. The main analytical technique will be EPR spectroscopy – a method very similar to NMR but providing information about free radicals. Detection and identification of radicals formed during phenylene diamine oxidation will be indispensable for establishing mechanistic details of this reaction.

The project is industrially sponsored (by Procter & Gamble).

The studentship is available from 1 October 2009, to work with Dr Victor Chechik (vc4[at]york.ac.uk) at University of York. Informal inquiries are welcome!

Funding for this physical organic chemistry project has been confirmed and is available to UK or EU students.

[1] D. Rogers, The Chemistry of Photography, RSC Publishing, 2007.

[2] K. C. Brown, S. Pohl, In: Permanent hair dyes, Society of Cosmetic Chemists, 1996; J. F. Corbett, J. Soc. Cosmet. Chem. 1984, 35, 297.

Keywords: Physical chemistry, organic chemistry, physical organic chemistry, reaction mechanism, EPR spectroscopy, ESR spectroscopy, free radicals, dyes

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