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Authors: K Adatia, M Raja, P. Vadgama

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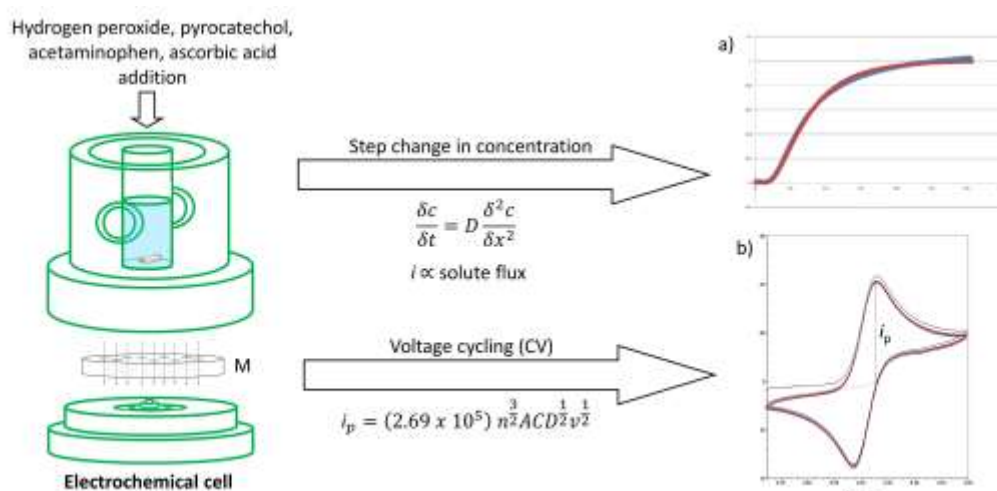
# An electrochemical study of microporous track-etched membrane permeability and the effect of surface protein layers

Adatia K\*, Raja M and Vadgama P

School of Materials and Engineering Science, Queen Mary University of London, Mile End Road, London, E1 4NS

\*Correspondence: k.adatia@se15.qmul.ac.uk

## Graphical abstract



Measurement of Fickian diffusion through track-etched membrane pores using a) step change in bulk concentration b) CV peak height ( $i_p$ ). M – track-etched membrane

## Highlights

- The diffusion of micro-solutes through membrane micro-pores is retarded
- PC and PET membranes show different diffusion limiting effects
- Pore water appears to be differently organised to bulk water
- Collagen exerts a steric effect even on micro-solute diffusion
- Charge repulsion effects reduced ascorbate diffusion

## Abstract

Microporous track-etched membranes serve as important permeable growth surfaces for cell culture where diffusive solute transport is needed across two growth compartments. This study has established effective solute diffusion coefficients for four probe micro-solutes: hydrogen peroxide, pyrocatechol, acetaminophen and ascorbic acid across three track-etched membranes formulated, respectively, from polycarbonate and polyethylene terephthalate. Chronoamperometry and cyclic voltammetry were used for the diffusion measurements. These showed substantially reduced intra-pore diffusion in relation to available pore area. Diffusion coefficients ranging from  $1.43 \times 10^{-10}$  to  $3.17 \times 10^{-7} \text{ cm}^2 \text{ s}^{-1}$  were demonstrated. This strongly suggests that water organisation in micro-pores is not equivalent to that of bulk water.

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