

Physical Chemistry CUME

Professor: J Lorieau

Date: January 2016

Topic: Fick's Law

1) **(25 pts)** Describe the types of processes Fick's law is used to describe. (1-5 sentences)

2) **(15 pts)** Fick's second law is

$$\frac{\partial c}{\partial t} = D \frac{\partial^2 c}{\partial x^2}$$

Describe what the variables and units are for 'c', 't', 'D' and 'x'.

3) **(30 pts)** A solution to Fick's second law is

$$c(x, t) = \frac{A}{\sqrt{t}} \exp\left(\frac{-x^2}{4Dt}\right)$$

Show that this is a solution to Fick's second law.

4) **(30 pts)** For a molecule with a high molecular weight and a molecule with a small molecular weight, draw the dependence of ' $c(x, t)$ ' and ' x ' for the equation in question 3 for $t=0s$, $t=1s$, $t=\infty$. Label the x- and y-axes, and define the integral under the curves. (6 plots altogether)