Solution
NAME

10.302
Fall 2004
QUIZ
Tuesday, November 23, 2004

With respect to the beverage container described in today's problem, it has been suggested that the rate of loss will be significantly less if a coating is applied to the interior surface of the bottle. The proposed coating has the following characteristics:

ℓ	=	25 μm
D_C	=	10^{-9} cm^2/s
$S_{coating/plastic}$	=	0.1

$S_{C/B} = S_{C/P} S_{P/B}$
$= 0.1 \times 1.5$
$= 0.15$

- U_T' 25% less than U_T
- $\frac{C}{C_o}(t=30\,d) \approx 0.99$

(5) 1. Do you recommend that the coating be adopted? Why?

$U_T' = \left[\frac{1}{h_B} + \frac{\ell}{D_C S_{C/B}} + \frac{L}{D_P S_{P/B}} + \frac{S_{B/A}}{h_A}\right]^{-1}$

$= [10^4 + 1.7\times10^7 + 5\times10^7 + 2]^{-1} = 1.5\times10^{-8}$

Not very different ∴ coating not worth cost $

(5) 2. Sketch (roughly) the new concentration profile for t = 30 days on the figure below.