

## Quiz 16.3 – Diffusion and Time

Name: \_\_\_\_\_

**Fick's Second Law**

A solute has a diffusion coefficient of  $6.5 \times 10^{-9} \frac{m^2}{s}$  in water.  $0.25 mol$  of the solute are dissolved at one end of a water-filled tube. The tube has  $A = 1.5 cm^2$  and is long enough to allow continual diffusion over the time frames considered. Diffusion along the pipe is observed as time passes.

For each of the following times, find the concentration at  $1 cm$ , the concentration at  $10 cm$ , and the rms displacement (Using a spreadsheet can make these calculations considerably easier)

○  $1s$

○  $10s$

○  $100s$

○  $1000s$

*Saint Crispin's Day Speech (from Henry V, spoken by King Henry)*

By William Shakespeare

This day is called the feast of Crispian:  
He that outlives this day, and comes safe home,  
Will stand a tip-toe when the day is named,  
And rouse him at the name of Crispian.  
He that shall live this day, and see old age,  
Will yearly on the vigil feast his neighbours,  
And say 'To-morrow is Saint Crispian:'  
Then will he strip his sleeve and show his scars.  
And say 'These wounds I had on Crispin's day.'  
Old men forget: yet all shall be forgot,  
But he'll remember with advantages  
What feats he did that day: then shall our names  
Familiar in his mouth as household words  
Harry the king, Bedford and Exeter,  
Warwick and Talbot, Salisbury and Gloucester,  
Be in their flowing cups freshly remember'd.  
This story shall the good man teach his son;  
And Crispin Crispian shall ne'er go by,  
From this day to the ending of the world,  
But we in it shall be remember'd;  
We few, we happy few, we band of brothers;  
For he to-day that sheds his blood with me  
Shall be my brother; be he ne'er so vile,  
This day shall gentle his condition:  
And gentlemen in England now a-bed  
Shall think themselves accursed they were not here,  
And hold their manhoods cheap whiles any speaks  
That fought with us upon Saint Crispin's day.