

Into a 100 mL beaker of initially pure water at 25°C is suspended a 1.5 cm diameter sphere of the organic solid eitemium. The solution is gently stirred, and after 45 seconds the water is measured to have an eitemium concentration of 11.4 mM. During this short time interval the size of the eitemium sphere does not change.

- a) What quantity of eitemium dissolves in 45 s (in mol)?
- b) What is the average molar flux of eitemium between the phases during that 45 seconds (in mol/cm²s)?
- c) Using that average flux and the average concentration during that 45 s, calculate the mass transfer coefficient of eitemium into water under these experimental conditions (in cm/s).

DATA:

The solubility of eitemium in water is 66 mM.

The Surface Area of a sphere = $4\pi R^2$

The Volume of a sphere = $(4/3)\pi R^3$