Qno:6. Hydrogen gas at 1 standard atm. And 25^0C flows through a pipe made of unvulcanised neoprene rubber with ID and OD of 25 and 50 mm respectively. If the concentration of hydrogen at the inner surface of the pipe is 2.37×10^{-3} kmol hydrogen/m^3 and the diffusivity of hydrogen through the rubber is 1.8×10^{-6} cm^2/s, estimate the rate of loss of hydrogen by diffusion through a pipe of 2 m length. The outside air may be assumed to be free from hydrogen.

Qno:7. Ammonia diffuses through nitrogen gas under equimolal counter diffusion at a total pressure of 1.013×10^5 Pa and at a temperature of 298 K. The diffusion path is 0.15m. The partial pressure of ammonia at one point is 1.5×10^4 Pa and at the other point is 5×10^3 Pa.Diffusivity under the given condition is 2.3×10^{-5} m^2/s.calculate the flux of ammonia.

Qno8: An ethanol-water solution is in contact at 20^0C with an organic liquid of film thickness 0.4 cm in which water is insoluble. The concentration of ethanol at the interface is 6.8 wt% and at the other side of film it is 10.8 wt%.The densities are 0.9881 g/cc and 0.9728 g/cc respectively for 6.8 wt% and 10.8 wt% ethanol solutions. Diffusivity of ethanol is 74×10^{-5} cm^2/s. calculate the steady state flux in kmol/m^2s.

Qno:9. Calculate the rate of diffusion of acetic acid (A) across a film of non-diffusing water (B) solution 2mm thick at 17^0C, when the concentration (by weight) on opposite sides of the film are 10% and 4% acid. The diffusivity of acetic acid in the solution is 0.000095 m^2/s.Density of 10% and 4% acid (by weight) are 1013 kg/m^3 and 1004 kg/m^3 respectively.

Qno:10. Carbon dioxide and oxygen experience equimolal counter diffusion in a circular tube whose length and diameter are 1m and 50 mm respectively. The system is at a total pressure of 10 atm. And a temperature of 25^0C. The ends of the tube are connected to large chambers in which the species concentrations are maintained at fixed values. The partial pressure of CO_2 at one end is 190 mmHg while at the other end is 95 mmHg.

(i) Estimate the rate of mass transfer.
(ii) Find the partial pressure of CO_2 at 0.75 m from the end where the partial pressure is 190 mmHg.

Diffusivity under given condition is 2.1×10^{-5} m^2/s.