**ETUK GABRIEL EDIMA**

**17/ENGO7/011**

**PTE314**

**SUBMITTED TO THE**

**DEPARTMENT OF PETROLEUM ENGINEERING**

**COLLEGE OF ENIGINEERING**

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Hydrogen gas is manifested at 4 bar and 1 bar on the opposite sides of a membrane of 0.5 mm thickness. At this temperature the diffusion coefficient is 8.7 x 10-8 m2/s. The solubility of hydrogen in the material which depends on the pressure is 1.5 x 10-3 m2/s bar.7

Determine the mass diffusion rate of hydrogen through the membrane.

Solution:

C1=1.5 x 10-3 x 4 = 6 x 10-3 kg mol/m3

C2=1.5 x 10-3 x 1 = 1.5 x 10-3 kg mol/m3

Considering plane wall condition

R=L/DA

=0.0004/8.7 x 10-8 x 1

Mole Flux= (6 x 10-3 – 1.5 x 10-3) / 0.0005/8.7 x 10-8 x 1

=7.83 x 10-7 kg mol/m2s

Mass Flux

=2 x 7.83 x 10-7 kg/m2s = 1.566 x 10-6 kg/m2s.