PROBLEM 1

An aeration system has been monitored to determine K_La. The dissolved oxygen versus time is shown in the following table. The saturation dissolved oxygen concentration is 9.0 mg/l. Use the data to data to determine K_La.

t, min	0	4	8	12	16	20	24	28
C, mg/l	1.2	2.4	3.7	4.3	5.0	5.6	6.0	6.6

PROBLEM 2

Given the following characteristics of an air stripping column to remove chloroform ($CHCl_3$) from ground water: Flow = 170 gpm, Column diameter = 3 ft, Packing = 2 in polypropylene (σ_c = 0.033) Tri-packs, D_L = 6×10^{-6} cm²/s, D_G = 0.09404 cm²/s. Air-to-water ratio = 100÷1. Determine the overall mass transfer coefficient K_La using the Onda correlation. Assume 20 °C. Henry's constant can be approximated using the following expression: $\boldsymbol{H} = \exp\left[\boldsymbol{A} - \frac{\boldsymbol{B}}{\boldsymbol{T}}\right]$ with A = 9.84 and B = $4.61\cdot10^3$.

PROBLEM 3

A ground water supply has been contaminated with ethylbenzene (EB). The maximum level of EB in the groundwater is 1.0 mg/l and this must be reduced to 35 µg/l using an air stripping column. The following data are given: K_La = 0.016 s^{-1}, Q_W = 7.13 l/s, Temperature = 20°C, H = 6.44×10^{-3} atm·m³/mol, Column diameter = 2.0 ft, Air-to-water ratio (Q_A/Q_W) = 20. Determine:

a) The liquid loading rate, L, mol/s·m²
b) The stripping factor, R, dimensionless
c) HTU (m), NTU (dimensionless)
d) The height of packing in column, m.

PROBLEM 4

The following data were obtained in a laboratory study conducted for the determination of the overall volumetric mass transfer coefficient in a packed bed air stripping unit with a diameter of 1 m and a height of 4m equipped with 4 equidistant sampling ports along its height. Contaminated groundwater containing an initial TCE concentration of 230 µg/l was fed to the stripping column at 1 m³/m²·min. The air to liquid ratio was 100. Based on the data determine $K_L\alpha$ (s^{-1}). Henry's constant for TCE is 0.428.

Depth, m	0	1	2	3	4
TCE, µg/l	230	140	80	50	30