

NAME:

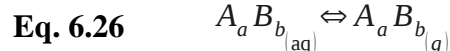
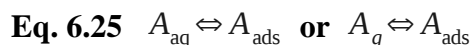
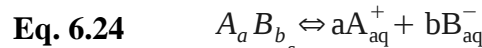
FOR EACH PROBLEM, MAKE (AND STATE) ANY REASONABLE ASSUMPTIONS NECESSARY FOR GETTING A SOLUTION, IN ADDITION TO THOSE GIVEN. BOX YOUR FINAL ANSWERS.

Final Exam Information

$1 \text{ m}^3 = 1000 \text{ L}$ $1 \text{ mg} = 10^{-3} \text{ g}$ $1 \text{ } \mu\text{g} = 10^{-6} \text{ g}$
 $T(\text{K}) = T(^{\circ}\text{C}) + 273.15$ $1 \text{ atm} = 101325 \text{ Pa}$ $g = 9.81 \text{ m/s}^2$
 Atomic weights (g/mol): 1 for H, 12 for C, 14 for N, 16 for O, 31 for P, 32 for S, 35.5 for Cl
 Density of pure water at 1atm and 4 °C = 1000 kg/m³

Eq. 4.3 $PV = nRT$ where $R = 0.08206 \text{ L atm mol}^{-1} \text{ K}^{-1}$

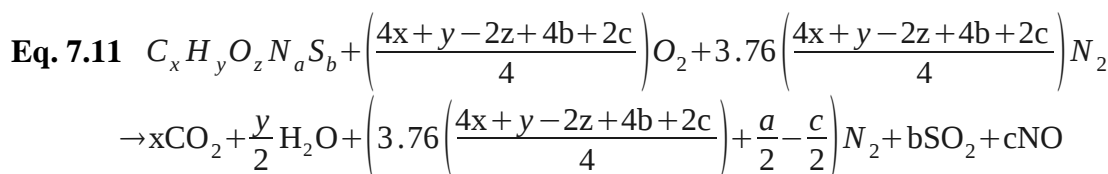
Eq. 4.4 $\rho_{\text{air}} = \frac{\text{mass air}}{\text{volume air}} = \frac{n_{\text{air}} \times MW_{\text{air}}}{V_{\text{air}}} = \frac{n_{\text{air}}}{V_{\text{air}}} \times MW_{\text{air}} = \frac{P}{RT} \times MW_{\text{air}}$



Eq. 7.8 $E = A \times EF \times (1 - ER/100)$

Eq. 7.9 $EF = k \left(\frac{s}{12} \right)^a \left(\frac{W}{3} \right)^b$

Eq. 7.10 $EF = k \left(\frac{s}{12} \right)^a \left(\frac{V}{30} \right)^d \left(\frac{M}{0.5} \right)^{-c} - F$



Eq. 8.3 $f(t) = f_c + (f_0 - f_c)e^{-kt}$ **Eq. 8.4** $Q = XY \left[f_c + \frac{(f_0 - f_c)(1 - e^{-kt})}{k} \right]$ **Eq. 8.5** $v' = \frac{K}{\eta} \frac{dh}{dL}$

Eq. 8.9 $\forall \frac{d(\text{DO})}{dt} = \forall k_r (\text{DO}_s - \text{DO}) - \forall k_d L_0 e^{-k_d t}$ **Eq. 8.13** $D = \text{DO}_{\text{sat}}(T_0) - \text{DO}$

Temperature (°C)	Chloride Concentration in Water (mg/L)			
	0	5000	10,000	15,000
0	14.62	13.73	12.89	12.10
5	12.77	12.02	11.32	10.66
10	11.29	10.66	10.06	9.49
15	10.08	9.54	9.03	8.54
20	9.09	8.62	8.17	7.75
25	8.26	7.85	7.46	7.08
30	7.56	7.19	6.85	6.51

Eq. 8.17 $\text{DO}(t) = \text{DO}_{\text{sat}}(T_0) - \frac{k_d L_0}{k_r - k_d} [e^{-k_d t} - e^{-k_r t}] - D_0 e^{-k_r t}$ **Eq. 8.21** $f_i(t) = \frac{f(t)}{R}$ **Eq. 8.22** $v_i' = \frac{v'}{R}$

Eq. 8.18 $L(t) = L_0 e^{-k_d t}$

Eq. 8.19 $t_c = \frac{1}{k_r - k_d} \ln \left[\frac{k_r}{k_d} \left(1 - \frac{D_0}{L_0} \frac{k_r - k_d}{k_d} \right) \right]$

Eq. 8.20 $R = 1 + \frac{\rho_s}{\eta} K_{oc} f_{oc} = 1 + \frac{\rho_s}{\eta} K_d$

Eq. 9.1 Erosion rate = $R \times K \times LS \times C \times P$

Soil type	fc (cm/h)	fo (cm/h)	k (h ⁻¹)
Alphalpha loamy sand	3.56	48.26	38.29
Carnegie sandy loam	4.50	35.52	19.64
Dothan loamy sand	6.68	8.81	1.40
Fuquay loamy sand	6.15	15.85	4.70
Leefield loamy sand	4.39	28.80	7.70
Troop sand	4.57	58.45	32.71

Table 8.2