Physical Chemistry of Colloids and Surfaces – Midterm I reference

Constants:

$k_B = 1.38 \times 10^{-23}$ J/K k_BT (298K) = 4.11×10^{-21} J g = 9.80 m/s^2

R = 8.314 J/mol K $N_{av} = 6.02 \times 10^{23}$

Equations:

$$\frac{P}{P_o} = \exp\left(\frac{-Mgz}{RT}\right) \qquad \frac{c_i}{c_{io}} = \exp\left(\frac{\Phi_i}{k_BT}\right) \qquad \Phi_i = \frac{4pr^3}{3}\left(r_P - r_f\right)z = sfgz$$

$$D = \frac{kT}{6p\mu r} \qquad v_{sed} = sg\,; \qquad v_{sed} = s^2 r \qquad s_{sph} = \frac{4pr^3}{3f}\left(r_P - r_f\right)$$

$$s = \frac{V}{f}\left(r_P - r_f\right) \qquad j = -D\left(\frac{dc}{dx}\right) \frac{\partial c}{\partial t} = D\left(\frac{\partial^2 c}{\partial x^2}\right) \qquad \ln\left(\frac{c_2}{c_1}\right) = \frac{sg}{D}\left(x_2 - x_1\right)$$

$$\ln\left(\frac{c_2}{c_1}\right) = \frac{s\omega^2}{2D}\left(r_2^2 - r_1^2\right) \qquad \left\langle r^2 \right\rangle = 6Dt \qquad P(n,x)dx = \frac{1}{\sqrt{4pDt}} \exp\left(\frac{-x^2}{4Dt}\right)dx$$

$$\gamma = \left(\frac{\partial G}{\partial A}\right)_{T,P} \qquad P_{in} - P_{out} = \Delta P = \gamma\left[\frac{1}{R_1} + \frac{1}{R_2}\right] \qquad \frac{2\gamma}{R} = \Delta\rho gh$$

$$\ln\left(\frac{p_{vap}}{p_{vb}}\right) = \frac{2\gamma \overline{V_L}}{rRT} \qquad \ln\left(\frac{p_{vap}}{p_{vb}}\right) = -\frac{2\gamma \overline{V_g}}{rRT}$$

$$\ln\left(\frac{T}{T_o}\right) = \frac{-2\overline{V_L}\gamma}{\Delta H_{vap} r} \qquad \Delta H_{vap}\left[\frac{1}{T_o} - \frac{1}{T}\right] = R \ln\left[\frac{\frac{2\gamma}{r} - P_l}{P_l}\right]$$

$$\cos\theta = \frac{\gamma_{sv} - \gamma_{sl}}{\gamma_{lv}} \qquad S = \gamma_{sv} - \gamma_{sl} - \gamma_{lv} \qquad P_{in} - P_{out} = \Delta P = \frac{2\gamma\cos\theta}{R}$$

$$\frac{2\gamma\cos\theta}{R} = \Delta\rho gh \qquad \frac{dV^*}{dR} = \left(\frac{-dV}{d\Delta P}\right)\frac{(\Delta P)^2}{2\gamma\cos\theta} \qquad F_{cap} \cong 2p R\gamma_L$$

$$\ln\left(\frac{p_{vap}}{p_{vb}}\right)=\frac{-2\overline{V_L}g_{lv}\cos q}{rRT} \qquad dg=-\sum_i \Gamma_i dm_i \qquad \Gamma_{surf}=\frac{1}{RT}\left(\frac{-\partial g}{\partial \ln c_{surf}}\right)_T$$

$$\Gamma_{surf}=\frac{1}{2RT}\left(\frac{-\partial g}{\partial \ln c_{surf}}\right)_T \qquad \Gamma=\frac{\Gamma_{\max} c}{K'+c} \qquad \Pi_S=RT\Gamma_{\max}\ln\left(\frac{K'+c}{K'}\right)$$