Some Rules of Thumb

M in Kg/mol, s in Svedbergs (10^{-13} sec), D in Ficks (10^{-7}cm^2 sec^{-1}),

R_s in Ångstroms, *speed* in rpm/1000, ρ=1.000 g/cc, $\bar{v}$=0.725 cc/g, $T = 293^o$ K.

Transport

$M = 91\frac{s}{D}$

$R_s = 215/D_{20,w}$

$s = 2.4M/R_s$

$f/f_o = 0.31M^{2/3}/s \qquad (\delta_1 = 0.3)$

$D < 19.2/s^{0.5}$

For the equivalent sphere

$\underline{\boldsymbol{\delta_1 = 0.0}}$

$R_o = \frac{20}{3}M^{\frac{1}{3}}$

$s_o = M^{\frac{2}{3}}/2.8$

$s_o = M^{\frac{2}{3}}\left[\frac{(1-\bar{v}\rho)/\bar{v}^{\frac{1}{3}}}{0.8337}\right]$

$M = 4.7s_o^{\frac{3}{2}}$

$R_o = 7.35(M\bar{v})^{\frac{1}{3}}$

$\underline{\boldsymbol{\delta_1 = 0.3}}$

$R_o = \frac{30}{4}M^{\frac{1}{2}}$

$s_o = M^{\frac{2}{3}}/3.2$

$M = 5.7s_o^{\frac{3}{2}}$

$R_o = 7.35\{M(\bar{v} + 0.3)\}^{\frac{1}{3}}$

For the random coil

$\underline{\boldsymbol{\delta_1 = 0.0}}$

$R_s = 10.0M^{0.56}$

$s_{rc} = 0.24M^{0.44}$

$\underline{\boldsymbol{\delta_1 = 0.3}}$

$R_s = \frac{90}{8}M^{0.56}$

$s_{rc} = 0.21M^{0.44}$

$s_o/s_{rc} = 1.48M^{0.22}$

For a prolate ellipsoid of revolution

where $a/b > 5.0$, $f/f_o = (a/b)^{\frac{2}{3}}/ln(2a/b)$

For DCDT analysis

$\Delta t/t = \Delta ln(\omega^2 t) < \frac{70}{(M^{0.5}speed)}$

$D = (\sigma\omega^2 tr_{men})^2/2t$ (where σ = std dev of g(s*) peak in svedbergs)

Sedimentation Equilibrium

For $\underline{\sigma > 2.0cm^{-2}}$, where $\sigma \equiv d(lnc)/d(r^2/2) = M(1-\bar{v}\rho)\omega 2/RT = \frac{\omega^2 s}{D}$

$t_{eq,5^o} = 4.0\text{x}10^4/(s_{20,w}(speed)^2)$ hours ($\tau = 0.22$) (column height=3mm)

$t_{eq,5^o} = 1.7\text{x}10^4 R_S/(M(speed)^2)$ hours ($\tau = 0.22$) (column height=3mm)

$t_{eq,5^o} = 3.66\text{x}10^6/(DM(speed)^2)$ hours ($\tau = 0.22$) (column height=3mm)

$t_{os}/t_{eq} = 0.134(\sigma)0.58/((\omega_{os}/\omega_{eq})^2 - 0.5)$

For $\underline{\sigma > 0}$:

Compute time to equilibrium at any speed: `http://rasmb.org/AUCRL/time_to_equilibrium-form.html`

$speed_{eq} = 88[\sigma/M]^{0.5}$; $\qquad M = 7777[\sigma/(speed_{eq})^2]$, and $\qquad \sigma = M(speed_{eq})^2/7777$

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