



Sedimentation during Centrifugation

Derivation & Interpretation of the Svedberg Equation

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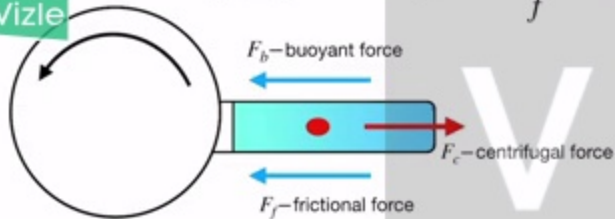
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The Svedberg Equation

$$s = \frac{m(1 - \bar{v}\rho)}{f}$$



$$F_c - (F_b + F_f) = 0$$



The Svedberg Equation

$$s = \frac{m(1 - \bar{v}\rho)}{f}$$

$$r_c = m \cdot \omega^2 r - F_b = m_{dist} \cdot \omega^2 r - F_f = f \cdot v = 0$$

$$m_{dist} = m \cdot \frac{\rho_{fluid}}{\rho_{particle}} = m \cdot \bar{v}$$

$$\bar{v} = \frac{1}{\rho_{particle}}$$

$$\underline{m\omega^2 r} - \underline{m\bar{v}\omega^2 r} - \underline{f \cdot v} = 0$$

$$m\omega^2 r (1 - \bar{v}\rho) = f \cdot v$$

$$\frac{m(1 - \bar{v}\rho)}{f} = \frac{v}{\omega^2 r} = s$$

Sedimentation Coefficient vs Shape

$$s = \frac{m(1 - \bar{v}\rho)}{f}$$

- The shape of particle affects to its sedimentation speed
- More spherical particles have lower frictional coefficient (f) values than a less spherical particles of equal mass.





Sedimentation Coefficient vs Particle's Density

$$s = \frac{m(1 - \bar{v}\rho)}{f}$$

= 0.5
= 0.3

- More dense particles move quicker than a less dense ones

$\downarrow \bar{v} = \frac{1}{f_{particle}} \uparrow$



$\bar{v}_1 < \bar{v}_2$
= 0.5 = 0.7

$s_1 > s_2$





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