Sedimentation Coefficient

The terms r, $\rho_{P,}$ ρ_M and η are constant for a given particle in a homogeneous medium, the sedimentation rate, dx/dt, is proportional to $\omega^2 x$.

This proportionality is often expressed in terms of the **sedimentation coefficient, *S***.

S is simply a measure of the sedimentation velocity per unit of centrifugal force.

$$S_r = (dx/dt)/(\omega^2 x) = \frac{2r^2(\rho_P - \rho_M)}{9\eta}$$

Rotor Efficiency

The time required for a particle to traverse a rotor is known as the pelleting efficiency or ***k-factor***.

The *k*- or clearing factor;

- is calculated at the maximum rated rotor speed
- is a function of rotor design
- is a constant for a given rotor.
- provides a convenient means of determining the minimum residence time required to pellet a particle in a given rotor.
- are useful for comparing sedimentation times for different rotors.

Types of Centrifugal Separations

- One approach to classify centrifugal separations is according to the phase of the medium and the phase of the material to be purified.
- Gas-phase separations are very important in certain applications, particularly uranium isotope enrichment, but are highly specialized and not widely used.
- Liquid-liquid and even liquid-solid separations are common.

- It may also be classified according to the method by which purified fractions are recovered. Three modes are used:
  - **Batch mode**
  - **Semi-batch mode**
  - **Continuous mode**

Types of Centrifugal Separations

- Differential sedimentation
- Density gradient
  - Rate-zonal
  - Isopycnic
- Analytical centrifugation
- Continuous centrifugation
- Filtration