Moments of Crystal Distribution

Moment	Meaning	Definition	Total for Continuous Crystallizer	Fraction for Continuous Crystallizer
0	Number of Crystals	$\int_0^L n\,dL$	$\dfrac{n_\circ GV}{Q}$	$1 - e^{-\chi}$
1	Size of Crystals	$\int_0^L nL\,dL$	$n_\circ \left(\dfrac{GV}{Q}\right)^2$	$1 - (1 + \chi)e^{-\chi}$
2	Area of Crystals	$\int_0^L nL^2\,dL$	$12\phi_A n_\circ \left(\dfrac{GV}{Q}\right)^3$	$1 - (1 + \chi + \tfrac{1}{2}\chi^2)e^{-\chi}$
3	Mass of Crystals	$\int_0^L nL^3\,dL$	$6\phi_V \rho n_\circ \left(\dfrac{GV}{Q}\right)^4$	$1 - (1 + \chi + \tfrac{1}{2}\chi^2 + \tfrac{1}{6}\chi^3)e^{-\chi}$

ϕ_V and ϕ_A are geometric volume and area factors which are characteristic of the crystal shape

G = crystal growth rate

Q = flowrate in continuous process

V = volume of crystallizer (continuous process)

n_0 = initial population density

$\chi = LQ/GV$ = dimensionless size