Appendix M: General Calculation Equations

Geometric Shape Volumes

Cylinder	= * radius * radius * height
	= 3.1415 * (diameter/2) * (diameter/2) * height
	= 0.78 * diameter * diameter * height
Cone	= 0.33 * radius * radius * height
	= 0.33 * 3.1415 * (diameter/2) * (diameter/2) * height
	= 0.26 * diameter * diameter * height
Sphere	= 1.33 * π * radius * radius * radius
	= 1.33 * 3.1415 * (diameter/2) * (diameter/2) * (diameter/2)
	= 0.522 * diameter * diameter * diameter

Gravimetric Quantitation

Solid Samples

% Compound = (Weight extracted compound/Original sample weight) * 100
Amount of compound in original container = % Compound * Original bulk weight

Liquid Samples

Sample concentration = Weight of extracted compound/Volume of extracted sample
Amount of compound in original container = Sample concentration * Original volume of seized item

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Serial Dilution Quantitation

Line equation	$Y = (m^*x) + b$
Line slope (m)	= (Standard concentration$_{max.}$ – Standard concentration$_{min.}$)/(Standard instrument response$_{max.}$ – Standard instrument response$_{min.}$)
Concentration (y)	= [Line slope (m) * Instrument response (x)] + Y intercept (b)
	= {[Standard concentration$_{max.}$ – Standard concentration$_{min.}$/(Standard instrument response$_{max.}$ – Standard instrument response$_{min.}$)] * Unknown instrument response} + 0 (assumed)
Percentage	= (Calculated concentration/Sample concentration) * 100
	= [Calculated concentration/(Sample weight/Sample volume)] * 100

Single Standard Solution Quantitation

Concentration unknown	= (Peak area unknown * concentration standard)/Peak area standard
Concentration unknown	= (Peak area unknown * Peak area internal standard of standard * concentration standard)/(Peak area standard * Peak area internal standard of unknown)

Production Estimates

Conversion factor (n)	= Molecular weight final product/molecular weight precursor chemical
Weight theoretical	= n * Weight precursor chemical
Weight actual	= n * Weight precursor chemical * percentage yield estimated

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