Aquaculture

Aquaculture Water Treatment Calculations

System Volume – Knowing the volume of water in the recirculating system is important to calculating water exchange requirements, applications of therapeutants for the fish, and the amount of chemical disinfectants required for sterilization. The calculation of the volume of a given system is a function of the geometry of the culture tank, filters, and plumbing. The portion of the system to be treated also depends on the goals of the farmer; for instance, a bath treatment will likely only be done in the culture tank with the water flow shut off, and should not include the full volume of the system. Figure 1 (page 2) shows some formulas for calculating the volume of some commonly used tank shapes in recirculating aquaculture. A useful tool for calculating system volume can be found at **www.calculator.net/volume-calculator.html**.

Active Ingredient Calculations – Each product added to an aquaculture system as a therapeutant or sterilizing agent has a portion of the mass or volume that is active ingredient (i.e., performs the desired task) and a portion that is inactive, which serves a purpose other than performing the desired task. Recommendations for chemical applications generally should be calculated as a specific concentration of active ingredient.

$$\text{Active Ingredient (\%)} = \frac{\text{(Active Ingredient Mass)}}{\text{Total Mass}} \times 100$$

$$\text{Chemical Addition Requirements} = \left(\frac{\text{Desired Chemical Concentration}}{\left(\frac{\text{Active Ingredient (\%)}}{100} \right)} \right) \times \text{Container Volume}$$

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COMMONLY USED TANK SHAPES

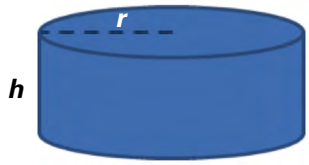
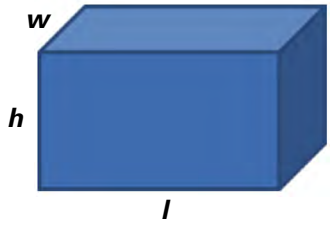
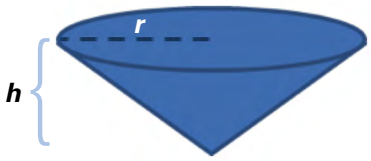
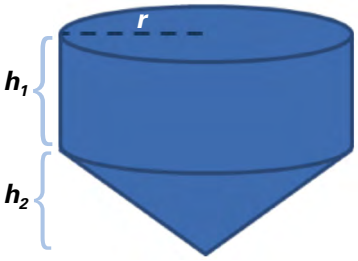
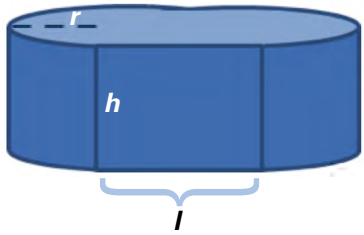
	**Cylinder**	$V = \pi \cdot r^2 \cdot h$
	**Rectangular Tank**	$V = l \cdot w \cdot h$
	**Cone**	$V = \frac{1}{3}\pi \cdot r^2 \cdot h$
	**Cone Bottom Tank**	$V = \left(\pi \cdot r^2 \cdot h_1\right) + \left(\frac{1}{3}\pi \cdot r^2 \cdot h_2\right)$
	**Elliptical Raceway Tank**	$V = \left(\pi \cdot r^2 \cdot h\right) + \left(l \cdot 2r \cdot h\right)$

Figure 1. Formulas for calculating the volume of some commonly used tank shapes

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