Acidifying a sample to a specific acid concentration before analysis

For ICP analysis, aqueous samples need to be acidified to keep the analytes of interest in solution prior to being nebulized. The acid concentration of the standards and rinse must be matched to the acid concentration in the sample to improve the plasma stability. Samples can be acidified with either HCl or HNO_3. Some analytes are more stable in one acid or the other. For analysis of the major cations in natural waters (Ca, Mg, Na, K) nitric acid has worked well. The higher the concentration of salts the higher the concentration of acid that is needed. If the sample has floc, it needs increased acidification. The higher the acid concentration the more degradation by devitrification the torch will see.

Always use trace metal grade acid for ICP samples. Lower grade acids have metal contamination.

Say we want to acidify our sample to 0.5(wt)% HNO_3. How much acid will you need to add? Concentrated nitric acid is 67wt%.

$$\left(\frac{x\ g \times \frac{67g\ NO3}{100g\ acid}}{10\ g\ sol'n}\right) = \frac{0.05g\ NO3}{100\ g\ solution}$$

$$\frac{0.05\ gHNO3}{100\ g\ sol'n} \times 10gsol'n \times \frac{100g\ acid}{67g\ HNO3} \times \frac{1ml}{1.5g\ acid} \times \frac{1000ul}{ml} = 50ul\ of\ acid$$

You will need to add 50 ul of 67% HNO_3 to a sample of 10ml to obtain 0.5% HNO_3 in the sample.

		sample volume			
		5ml	**10ml**	**1l**	**2l**
desired acid concentration	**0.5%**	25ul	50ul	5ml	10ml
	1%	50ul	100ul	10ml	20ml
	2%	100ul	200ul	20ml	40ml
	4%	200ul	400ul	40ml	80ml