ALCOHOL WATER MIXTURES



WHY ARE ALCOHOL AND WATER DISINFECTANTS UNUSUAL?

- When alcohols (such as ethanol or isopropyl alcohol) are mixed with water, the final volume is always slightly less than the two volumes added together.
- For example: 700ml of ethanol + 300ml of water, does not equal 1000ml once mixed.
- This is a normal and well understood physical effect called negative excess volume.
- This occurs because alcohol and water molecules attract each other very strongly when mixed.
- As a result, the molecules pack together more tightly than they do when separate, causing the mixture to shrink slightly in volume.

WHY IS THIS IMPORTANT?

- Microncleanʼs alcohol disinfectants are labelled as 70% v/v (volume/volume).
- This means that the 70% alcohol and 30% water are measured by volume and not by weight (some regulations may ask for %w/w, even though this is not as accurate).
- Because of the ‘negative excess volume effect’, a 70% alcohol solution by volume is not the same as 70% by weight, and a simple density calculation cannot be used to correctly calculate the %w/w.

WHAT ARE THE ALCOHOL CONTENTS?

	%v/v	%w/w
Amount of isopropyl alcohol in IPA	70	62.76
Amount of denatured ethanol in IMS	70	62.4*
Amount of ethanol in IMS	66.5	59.3*

(only correct at 20°C); *approximate

KEY POINTS

- Alcohol disinfectant labels and specifications are correct when stated as 70% v/v.
- Weight percentages will always appear lower, due to density differences and negative excess volume, as described above.
- This does not affect disinfectant performance.
- This behaviour is standard across the cleanroom industry.
- A 70% v/v alcohol disinfectant contains the correct amount of alcohol for effective, optimal disinfection.
- Differences between volume and weight based percentages are a normal physical property of alcohol water mixtures and are not a quality issue.



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