Formalin Fixative

For histology the standard preferred fixative is 10% neutral buffered formalin (NBF). This is best purchased as a prepared solution and avoids any additional risks of handling needed to mix the NBF yourself from stock solutions. We supply our clients with sample pots prefilled with 10% NBF for your convenience.

Making 10% Neutral Buffered Formalin from stock solutions

Where only a standard stock solution of formalin* is available it is typically 37-40% formaldehyde (a gas) in aqueous solution and unbuffered. To make a histological fixative from this we need a 10% solution** of this stock formalin i.e. 1 part of the stock formalin with 9 parts water, preferably distilled. This makes an unbuffered formalin solution, which will have a pH of 3-4. If used unbuffered the acidity can react with haemoglobin in the tissues to produce dark brown acid formaldehyde haematin precipitates, which complicate histological interpretation.

To adjust the 10% formalin solution to a neutral pH you would need to mix in quantities of a buffer, typically sodium phosphate. A recommended recipe is as follows:

100ml Formalin (37-40% stock solution)
900ml Water
4g/L NaH2PO4 (monobasic)
6.5g/L Na2HPO4 (dibasic/anhydrous)

10% formalin can also be referred to as formal or formol. A common example is formal saline which is another method of fixative preparation using sodium chloride and sodium phosphate to buffer as follows:

100ml Formalin (37-40% stock solution)
900ml Water
9g NaCl
12g Na2HPO4 (dibasic/anhydrous)

*** Formalin is formaldehyde gas dissolved in water and reaches saturation at 37-40%formaldehyde. This can therefore regarded as 100% formalin**

**** 10% formalin actually represents10% of the 37-40% stock solution. The actual amount of dissolved formaldehyde in the 10% formalin is therefore only 3.7-4.0%.**