

Preparation of Blood Analog Fluid (BAF)

Target BAF composition: 60% by volume of water, 40% by volume of glycerin, 1.7 g sodium chloride (NaCl)/100 mL of BAF

Approximate target BAF volume: 4 – 4.5 L

Ingredients:

- De-ionized (DI) water – 2.4 L
- Vegetable glycerin – 1.74 L
- NaCl – 71.4 g

1. Thoroughly mix all the ingredients in a glass jar (either using a stirrer or by manually shaking the jar) until all the NaCl particulates visually appear to have dissolved and there is no visual separation of water and glycerin.
2. Perform verification activities for the BAF solution following the steps outlined below.

Note: For preliminary or feasibility testing, DI water may be used in place of BAF as the test fluid. While all test protocols in this document are written for BAF, they are also directly applicable to DI water, when used as the test fluid.

Verification of BAF Properties

Viscosity measurement

1. Turn on a cone-and-plate rheometer [Gemini II, Bohlin Instruments, Cirencester, UK] and prepare it for viscosity measurements per the instrument's step-by-step instructions.
2. Attach a 60 mm – 0.5 ° cone spindle to the rheometer.
3. Measure the room temperature of the laboratory in which the mock circulatory loop (MCL) is located. Set the viscosity measurement temperature on the rheometer software to the measured room temperature (~ 22 °C).
4. Set the following parameters on the rheometer software: shear rate = 50 – 1550 1/s, 50 samples.
5. Sample 0.5 mL of BAF solution and evenly dispense it onto the plate of the rheometer.
6. Select the Start button on the rheometer software to begin making viscosity measurements across the applicable range of clinically relevant shear rates.
7. Compute and record the mean and standard deviation of viscosity values over the entire shear rate range.
8. Conduct five (N = 5) trials of viscosity measurements by repeating steps 5 – 7 above.
9. Take the statistical average of the mean viscosity values from the five trials and report it as the BAF viscosity in centiPoise (cP) or mPa.s.

Density measurement

1. Sample 100 mL of BAF solution and measure its weight using a precision balance scale.
2. Compute and record the BAF density (= weight (in g) / 100 mL) in g/cm³.

3. Conduct three ($N = 3$) trials of density measurements by repeating steps 1 – 2 above.
4. Take the statistical average of the density values from the three trials and report it as the BAF density.