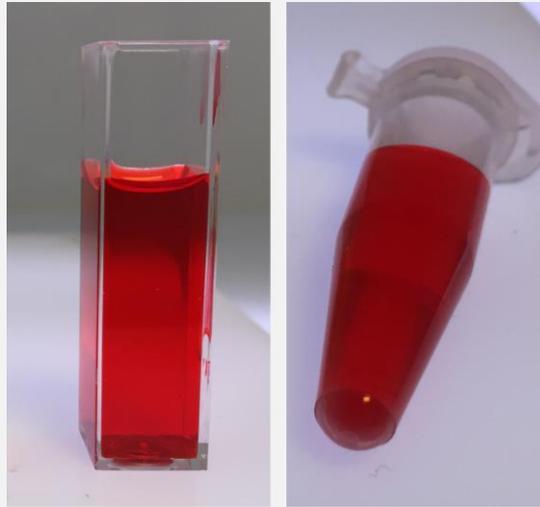


TL3 Whole blood flow equivalent



TL3 is a test liquid with flow properties identical to normal whole blood. TL3 can be used for a number of applications, but is developed for early phase testing and QC of medical devices where using real blood samples is unpractical.

TL3 features

- Flow properties; Viscosity, density and surface tension identical to normal whole blood
- Non-Newtonian properties (shear thinning) matched to normal whole blood
- Colored red for intuitive identification as whole blood equivalent
- Safe; non-toxic and biocompatible

Normal blood

Significant variations in the properties of whole blood are common, especially blood from a person with abnormal medical conditions. Potential (but uncommon) variations in blood hematocrit and protein content, can give a variability of $\pm 50\%$ in whole blood viscosity.

When we say normal whole blood, it means the most common properties of blood from healthy humans. We have matched 45% hematocrit, but we can provide other equivalent hematocrits if this is needed for testing of a specific device.

A pure chemical liquid

TL3 is a pure chemical solution, and thus does not contain blood cells, fibrinogen, proteins, virus, DNA, bacteria, urea etc. It is thus safe to use, and will not perform any biological function such as oxygen transport, clotting etc.

No blood cells

Since the whole blood test liquid does not contain blood cells it cannot accurately emulate whole blood in fluidic structures comparable in size to red blood cells ($<10 \mu\text{m}$). We don't recommend using TL3 for fluidic structures with diameters smaller than $20 \mu\text{m}$.

Optical properties

The red color is intended to signal that the liquid is a whole blood flow equivalent. The red color and other optical properties of TL3 are not intended to match whole blood.

Temperature sensitivity

The flow of whole blood is temperature sensitive and this temperature sensitivity is matched in TL3. TL3 will accurately match whole blood between 4°C and 45°C.

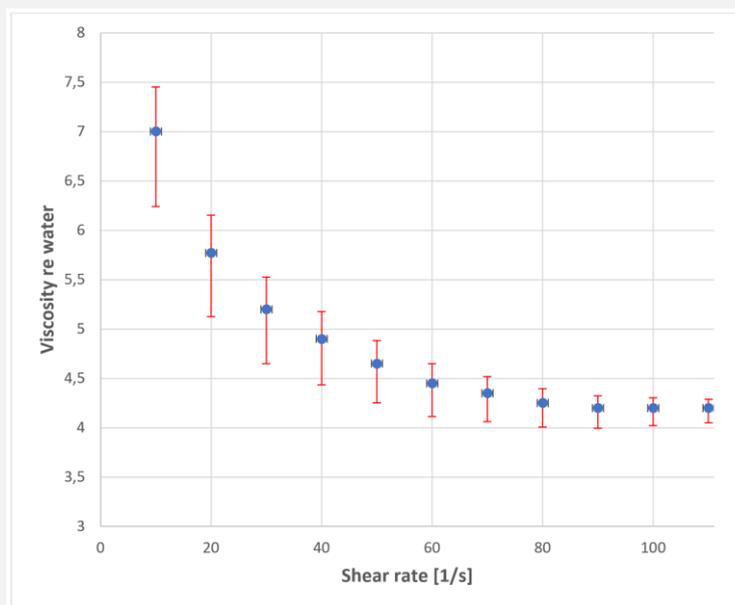
Due to the temperature sensitivity of whole blood and TL3, you can expect to see flow variability in your device unless you control the temperature of both the device and the test liquid.

Material compatibility

TL3 is compatible with all water compatible materials. Residues of the red dye in TL3 may permanently color some materials.

TL3 Properties

	TL3	Whole blood range
Viscosity	4.2 re. water	1.7 – 8 re. water
Equivalent hematocrit	45%	20% - 65%
Surface tension	58 mN/m @ 23°C	54-63 mN/m @ 23°C
Density	1.06 g/cm ³	1.056 - 1.066 g/cm ³



The non-Newtonian property of TL3 is clearly seen in this plot of viscosity vs. shear rate. The blue markers are TL3, the red bands show the range for whole blood based on 7 healthy blood donors.

Storage, disposal and safety

Storage

Store TL3 upright and in tightly closed containers in a cool, dry environment away from direct sunlight at a temperature of 4-27°C (40-80°F). Shelf life is 12 months from date of manufacture. Avoid contamination of the liquid in the bottle, since there are no preservatives in TL3 to prevent growth of bacteria, fungi etc.

Disposal

TL3 may be included with other water based waste. It is the responsibility of the customer to ensure disposal is made in observance of all federal, state, and local environmental regulations.

Environmental, Health and Safety

TL3 consist of water and approved food additives. It is safe to drink but we definitely don't recommend doing so. It is biocompatible and completely safe.

Warranty

The information in this datasheet is based on our experience and is, we believe to be reliable, but may not be complete. We make no guarantee or warranty, expressed or implied, regarding the information, use, handling, storage, or possession of this product, or the application of any process described herein or the results desired, since the conditions of use and handling of the product is beyond our control.