

(30 pts.) Question 1. You are measuring the velocity of fluorescent compounds in a certain fluid. You intend to do this in a glass capillary with an automated instrument that pushes fluid at a known pressure. You introduce a small plug of the fluorescent compound into a capillary with an inner diameter of 50.04 micrometers and push it to a detection window in the capillary. The approximate length of the capillary from the site of injection to the detection window is 30 cm; however, you have access to a typical plastic metric ruler used to measure distances and can use this to measure the length of the capillary to the detection window. Once the compound is introduced into the capillary, the instrument applies a known and constant pressure of 1.387 bar, and then collects data at a rate of 10 Hz once the instrument applies pressure to the capillary tube. The software associated with the instrument returns a detection time of 17.2675 minutes.

1A) What variables are required for you to calculate velocity?

1B) Based on the information described above, how many significant figures exist for each of the variables listed in 1A. Justify your answer as necessary.

1C) Given the constraints outlined above, how many significant figures at most may you report your measured velocity? Justify your answer.