

## Procedure, Data, and Calculations

## Cautionary Notes:

- a. Water is sometimes spilled accidentally during this experiment. It is advisable to keep books and other personal property of the table where you are using the resonance-tube apparatus.
- b. A stethoscope is provided if you have difficulty hearing the sound from your own resonance tube. Its earpieces have been sterilized with alcohol. No more than one lab partner should use the stethoscope because of the danger of spreading an ear infection.

1. Measure and record the room temperature to the nearest tenth of a degree Celsius. Read the frequency engraved on the tuning fork and record it on the data table. Measure the inside diameter of the plastic resonance tube with a centimeter scale and record these values below and on the data table.

Room temperature:  $t_r =$  23 °C

Frequency of tuning fork:  $f =$  512.0 Hz

Inside diameter of tube:  $D =$  2.47 cm

2. Set the reservoir cup of the apparatus as high as it will go on the metal rod (i.e., until it bumps into the bracket supporting the top of the plastic tube). Be sure that the rubber tubing is tightly attached at one end to the reservoir and at the other end to the bottom of the plastic tube. Verify that the water level is approximately 14 cm below the top of the tube. If the level is too low, pour water from a beaker into the reservoir to correct this.
3. Strike the tuning fork on the rubber activator. Hold the tuning fork over the plastic tube with one prong directly over the other prong.
4. Slowly lower the water level in the plastic tube by lowering the water reservoir. Adjust the water level until the sound of the tuning fork is reinforced by resonance in the column of air above the water. It may be necessary to reactivate the tuning fork several times while searching for the water level at which the sound of the tuning fork is loudest. You will need to read the water level while it is changing at the instant the sound is loudest. Read the scale next to the plastic tube at this water level to the nearest .02 cm. Record this reading as the resonant length  $\ell$ .

Length of resonant column  
of air (reading 1):

$\ell =$  ~~13~~ 15.3 cm

5. Correct this value of the length of the air column by adding four-tenths of the diameter of the plastic tube. This correction is necessary because the antinode is not formed at the tube opening, but a little outside of it.

$$\ell_{\text{corr}} = \ell + .4 D$$

$$= 15.3 + 0.4$$

(Substitute)

$$= \underline{15.7} \text{ cm}$$

(Final answer)