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Speed of sound

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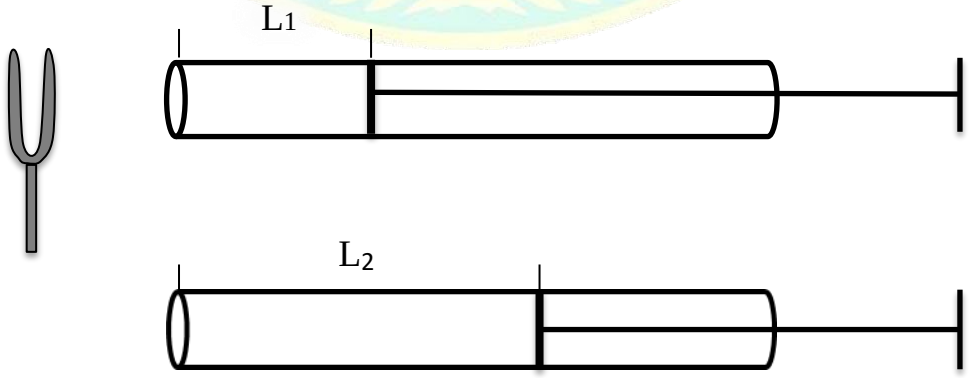
Purpose: measurement the speed of sound from the sound waves set up in the closed resonance tube.

Apparatus

1. Closed resonance tube of variable length (see figure).
2. Metric scale.
3. Tuning forks of different frequencies.
4. Rubber pad.
5. Thermometer.

Method

1- Select the fork of highest frequency.
2- Strike it smartly, and hold it near the top of the tube.
3- Adjust the length of the resonance column until resonance occurs.
4- Measure the length of the air column in the tube.
5- Repeat the measurement in step (4) three times and get mean value of length(L_1).
6- Find a second and different position of resonance using the same forks (about three times the length of the air column) then find the mean of (L_2).
7- Obtain different values of (L_1) and (L_2) using other forks. 8- Record the room temperature.



Reading

Frequency (Hz) (F)	First resonance position, length of air column (L_1)	Second resonance position (L_2)	Speed of sound $C = 2F(L_2 - L_1)$

Calculation

1) Find the speed of sound in laboratory (C) for each frequency.

$$C = 2F(L_2 - L_1) \quad \text{(m/sec)}$$

2) Find the mean value of (C).

$$C = \frac{C_1 + C_2 + C_3}{3} \quad \text{(m/sec)}$$

Questions

1. Why we prefer using tuning forks with high frequency?
2. What is the relation between the first length obtained from first resonance with the tuning forks?
3. What is the relation between the second length obtained from the second resonance with the tuning forks?