

OBJECTIVES

- **Measure** the speed of sound in air using a resonance apparatus.

MATERIALS LIST

- 4 tuning forks of different frequencies
- Erlenmeyer flask, 1000 mL
- resonance apparatus with clamp
- thermometer
- tuning-fork hammer
- water

The speed of sound can be determined using a tuning fork to produce resonance in a tube that is closed at the bottom but open on top. The wavelength of the sound may be calculated from the resonant length of the tube. In this experiment, you will use a resonance apparatus to measure the speed of sound.

SAFETY

- Put on goggles.
- Never put broken glass or ceramics in a regular waste container. Use a dustpan, brush, and heavy gloves to carefully pick up broken pieces and dispose of them in a container specifically provided for this purpose.
- If a thermometer breaks, notify the teacher immediately.

PROCEDURE**Preparation**

1. Read the entire lab, and plan what steps you will take.
2. If you are not using a datasheet provided by your teacher, prepare a data table in your lab notebook with four columns and five rows. In the first row, label the first through fourth columns *Trial*, *Length of Tube (m)*, *Frequency (Hz)*, and *Temperature (°C)*. In the first column, label the second through fifth rows 1, 2, 3, and 4.

Finding the Speed of Sound

3. Set up the resonance apparatus as shown in **Figure 1**.
4. Raise the reservoir so that the top is level with the top of the tube. Fill the reservoir with water until the level in the tube is at the 5 cm mark.
5. Measure and record the temperature of the air inside the tube. Select a tuning fork, and record the frequency of the fork in your data table.
6. Securely clamp the tuning fork in place as shown in the figure, with the lower tine about 1 cm above the end of the tube. Strike the tuning fork sharply, but not too hard, with the tuning-fork hammer to create a vibration. A few practice strikes may be helpful to distinguish the tonal sound of the tuning fork from the unwanted metallic “ringing” sound that may result from striking the fork too hard. **Do not strike the fork with anything other than a hard rubber mallet.**