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**Speed of Sound Lab**

**Purpose:** To determine the speed of sound in air

**Materials:**

* Plastic tube
* Pvc pipe (air column)
* Rubber stopper
* Tuning forks
* Meter stick or ruler

**Procedure:**

1. Plug one end of the plastic tube with the rubber stopper.
2. Place the pvc pipe in the plastic tube and fill the plastic tube almost full with water.
3. Tap a tuning fork on a book or relatively soft surface.
4. Hold the tuning fork over the pvc pipe and raise the pipe until you hear the sound amplified.
5. Use the meter stick to measure the height of the pipe above the water. Record in table below.
6. Use the measured length to calculate the wavelength and speed of sound in the pipe.

**Data:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| f (Hz) | L1 (m) | L2 (m) | Lavg (m) | v (m/s) | % error |
| 256 | 0.32 | 0.33 | 0.325 | 332.8 | -2.97 |
| 288 | 0.28 | 0.29 | 0.285 | 328.32 | -4.28 |
| 320 | 0.25 | 0.255 | 0.2525 | 323.2 | -5.77 |
| 384 | 0.21 | 0.21 | 0.21 | 322.56 | -5.96 |
| 425.5 | 0.19 | 0.19 | 0.19 | 323.38 | -5.72 |
| 480 | 0.165 | 0.16 | 0.1625 | 312 | -9.04 |
| 512 | 0.155 | 0.155 | 0.155 | 307.2 | -10.44 |
| 523.2 | 0.15 | 0.15 | 0.15 | 313.92 | -8.48 |

**Calculations:**

**Analysis:**

1. Explain what type of wave was created inside the pipe. i.e. open-closed, closed-closed, open,-open

The wave is open-closed because the top of the pipe was free to vibrate, while the bottom of the pipe was a closed boundary that reflected sound waves back.

1. Which harmonic of each frequency was heard? How can you be sure?

We know the first harmonic was heard because we heard the pure tone first when the pipe length was zero

1. What external factors could have contributed to your error? How could you control those variables to create a more precise experiment?

Weather and temperature may have contributed to the error, as well as water displacement by the pipe. This error can be minimized by being in a pressure and temperature controlled room and by using a more thin pipe to minimize displacement

1. Create a linear graph showing the speed of sound as the slope. Include the equation of your line.