FLAME TUBE

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INSTRUCTIONS FOR DEMONSTRATION

SETUP:

The "Flame Tube" is quickly set up in the classroom or lab. Place the tube level on a table where the main cylinder is not touching anything flammable. Secure the flexible tubing to the main gas valve and open the valve all the way. Light the burner, each hole will need to be lit individually- unlike an oven burner. Turn the gas down to where the flames are blue with some yellow at the tips. Dimming the lights in the room will make the wave patterns easier to see. Turn the volume up on the speaker and find a frequency that will give you a standing wave in the flames. If the gas is too low at this point some of the flames will go out, usually at a node, and will need to be re-lit. Drafts in the room can also cause the flames to go out. As the metal tube gets hot frequencies that give standing waves will change; a higher frequency will be needed to get the desired wave pattern. Changing the volume on the speaker will result in the wave having a larger or smaller amplitude.

The "Flame Tube" can also be used to calculate the speed of sound in a gas using the following equation: velocity = wavelength x frequency. The wavelength is 4 meters divided by the number of standing wave crests. The speed of sound in methane (CH_4) at room temperature (27 °C) is 450 m/s.

WAVECRESTS AND FREQUENCIES

The following table gives the number of standing wave crests and the frequencies in Hertz at which they are achieved. Also given is the wavelength in centimeters.

# WAVE CRESTS	FREQUENCY IN HERTZ	WAVELENGTH IN CM
1	102	400
2	212	200
3	322	133
4	432	100
5	542	80
6	652	67
7	762	57
8	872	50
9	982	44

The frequencies and wavelengths given above are approximations only. As the apparatus gets hot the frequencies needed for the desired number of standing waves go higher.

CAUTION

The "Flame Tube" gets HOT after only a few minutes and serious burns could occur. Use gloves while handling the apparatus.