Experiment 11: Speed of sound in gas

The table below (Fig. 4.1) gives information about the speed v of sound in gases at standard pressure (101 kPa). The temperature of each of the gases is 0 °C.

gas	*chemical formula*	*molar mass*/g	v/m s^{-1}
carbon dioxide	CO_2	44	260
helium	He	4	970
hydrogen	H_2	2	1290
nitrogen	N_2	28	334
oxygen	O_2	32	315

Fig. 4.1

It is found that all the values of v are different when the temperature of the gas is changed. Design laboratory experiments to investigate how v depends upon the given molar mass of each gas and on the temperature of each gas. In your account, you should pay particular attention to

(a) the control of variables,

(b) the method by which the speed of sound is to be measured,

(c) how the temperature of the gas may be changed,

(d) any important design features or precautions you would take which may improve the accuracy of your experiment.