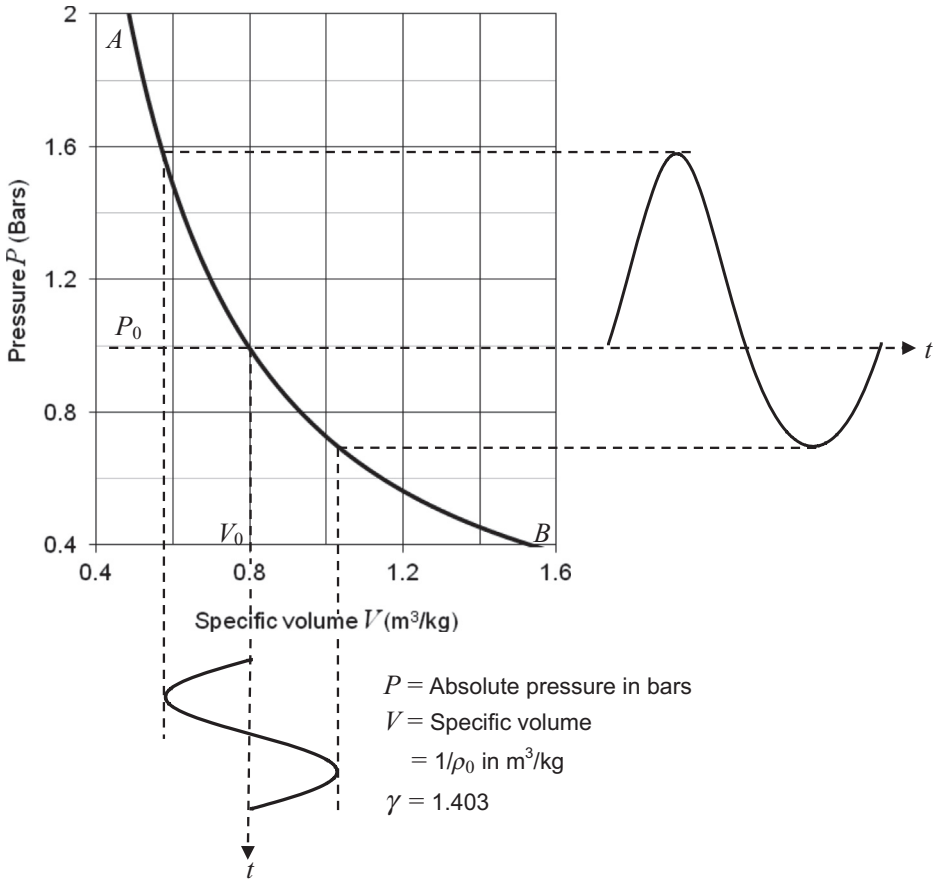

FIG. 9.12 Plot of the gas equation $PV^{\gamma} = 1.26 \times 10^4$, valid at 20°C.

Normal atmospheric pressure (0.76 m Hg) is shown as $P_0 = 1$ bar.

In Eq. (9.85*a*), substitute for p_1 the pressure $p_T e^{-mx/2}$, where p_T is the rms pressure of the fundamental at the throat of the horn in Pa and m is the flare constant.
Then let $p_T = \sqrt{I_T \rho_0 c}$, where I_T is the intensity of the sound at the throat in W/m^2 and $\rho_0 c$ is the characteristic acoustic impedance of air in rayls.
Integrate both sides of the resulting equation with respect to x.

This yields:

$$\text{per cent second-harmonic distortion} = \frac{50(\gamma+1)}{\gamma P_0}\sqrt{\frac{I_T \rho_0 c}{2}}\,\frac{f}{f_c}(1 - e^{-mx/2}) \tag{9.86}$$