

MIC-2/1st sem-2/Unit-2/EC-8/Phy/By VKS
Continuation of previous E-content ⑦

As it clear that

$$PV = (P+b)(V-v)$$

$$\text{or, } PV = PV - Pv + bV - bv$$

Since bv is very small, so it may be neglected

$$Pv = bV$$

$$\therefore P = \frac{bV}{v} = \frac{P}{V}$$

Hence, $P = \frac{\text{Volume stress}}{\text{Volume strain}} = \text{Bulk modulus}$

Error in Newton's formula for velocity of sound in air at NTP

$$\begin{aligned} \text{Normal air pressure} &= 76 \text{ cm Hg} \\ &= 76 \times 13.59 \times 980 \text{ dyne cm}^{-2} \end{aligned}$$

At 0°C and normal atmospheric pressure the density of air $= 0.001293 \text{ g cm}^{-3}$

Now from Newton's formula Velocity of sound

$$V = \sqrt{\frac{76 \times 13.59 \times 980}{0.001293}}$$

$$\therefore V = 280 \text{ ms}^{-1}$$

But this is theoretically calculated value of sound in air differs from experimental value (332 ms^{-1}).

Continue next E-content ⑧