Compressibility & Bulk modules of elasticity :

$$\boldsymbol{k = -\frac{dp}{\frac{dv}{v}}}$$

dp = pressure change , dv = volume change , v= original volume , K = Bulk modules of elasticity .

Example :

1.25 :

volume 1000cm3 at 1 MN^2/m and volume 995 Cm^3 at 2 MN^2/m what Bulk modules of elasticity (K) ?

$$k = -\frac{dp}{\frac{dv}{v}} = -\frac{2-1}{(995-1000)/1000} = 200\ Mpa$$

1.26 :

Find the bulk modulus of elasticity when pressure 150 psi applied to 10 ft^3 liquid causes a volume reduction of 0.02 ft^3 ?

$$k = -\frac{dp}{\frac{dv}{v}} = -\frac{(150-0)/144}{0.02/10} = 10800000\frac{ib}{ft3}$$

1.27 :

For K= 2.2 Gpa for the bulk modulus of elasticity for water , what pressure is required to reduces its volume bu 0.5 % ?

$$k = -\frac{dp}{\frac{dv}{v}} \quad 2.2 = -\frac{p2-0}{-0.005} = p2 = 0.011.Gpa$$

1.29 :

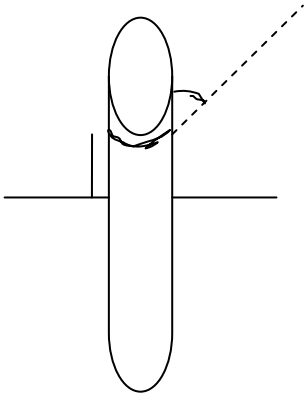
From the following test data, determent the bulk modules of elasticity of water : at 500 psi the volume was 1 ft^3 , and 3500 psi the volume was 0.990 ft^3 ?

$$k = -\frac{dp}{\frac{dv}{v}} = -\frac{500-3500}{\frac{1-0.99}{1}} = 300000\ psi$$

Capillarity :

$$\boldsymbol{h = \frac{4 * F \cos\theta}{\gamma * d}}$$

h = high tube fluid . F= surface tension , γ =specific weight , d= diameter of pip

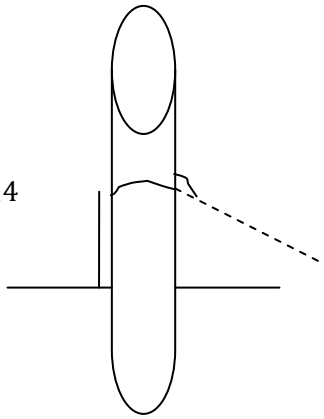


Example :

1 –

a – water $\theta = 0$, $r = 1\ mm$, $temprte = 20$, $surface\ tension = 0.073$

$$h = \frac{4 * F \cos\theta}{\gamma * d} = \frac{4 * 0.073}{9790 * 2\ E-3} = 0.0149\ m$$



b- mercury $\theta = 130$, $r = 1\ mm$, $\gamma = 13.6 \frac{KN}{m2}$, $surface\ tension = 0.514$

$$h = \frac{4 * F \cos\theta}{\gamma * d} = \frac{4 * 0.514 \cos 130}{13.6 * \ 2\ E-3} = \quad m$$