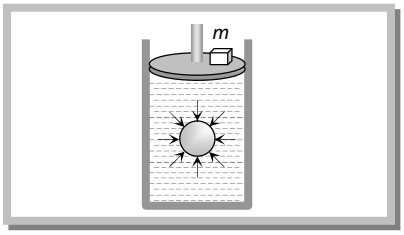
Fractional Change in the Radius of Sphere.

A solid sphere of radius R made of a material of bulk modulus K is surrounded by a liquid in a cylindrical container.

A massless piston of area a floats on the surface of the liquid.



Volume of the spherical body $V = \frac{4}{3}\pi R^3$

$$\frac{\Delta V}{V} = 3\frac{\Delta R}{R}$$

$\therefore$ $\frac{\Delta R}{R} = \frac{1}{3}\frac{\Delta V}{V}$ .....(i)

Bulk modulus $K = -V\frac{\Delta P}{\Delta V}$

$\therefore$ $\left|\frac{\Delta V}{V}\right| = \frac{\Delta P}{K} = \frac{mg}{AK}$ .....(ii) $\left[\text{As } \Delta P = \frac{mg}{A}\right]$

Substituting the value of $\frac{\Delta V}{V}$ from equation (ii) in equation (i) we get $\frac{\Delta R}{R} = \frac{1}{3}\frac{mg}{AK}$