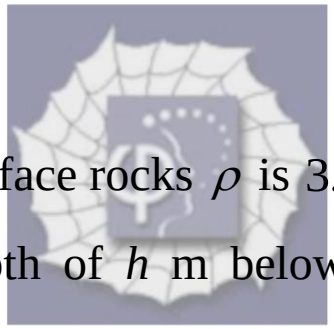
64.

Problem 15.12E (HRW)

Carbon crystallises as diamond at 1000^0 C *under a pressure of* 4.0 GPa. *We have to find the minimum depth at which diamonds can form under the subsurface rocks having density* 3.1 gm cm^{-3}. *We can assume, as in a fluid, the pressure is due to the weight of material lying above.*



Solution:

The density of surface rocks ρ is 3.1×10^3 kg m^{-3}.

Pressure at a depth of *h* m below above type of rock material will be

$\rho gh = 3.1\times10^3 \times 9.8 \times h$ Pa.

Depth *h* at which the pressure will be 4.0×10^9 Pa is given by the relation

$3.1\times10^3 \times 9.8 \times h$ Pa $= 4.0\times10^9$ Pa

or

$$h = \frac{4.0\times10^9}{3.1\times10^3 \times 9.8} = 1.32\times10^5 \text{ m.}$$