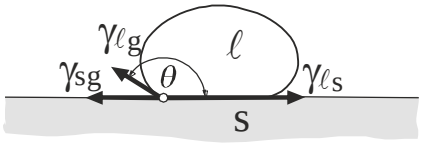
Problem 15-01 Young equation, wetting angle

A small amount of liquid of density 0.779 g cm^{-3} and surface tension 28.4 mN m^{-1}, placed on the surface of plane alumina plate forms a sessile drop with a contact angle $\theta = 115^{o}$.

(a) Sketch the shape of the drop with the interfacial tensions and contact angle

(b) The interfacial tension between the liquid and the solid surface is 38 mN m^{-1}. Calculate the surface energy of the solid surface.

[(a) 

(b) γ_{sg} = 26 mN m^{-1}]

Solution:

(a)

(b)

$\gamma_{\ell g}$ = 28.4 mN m^{-1},

$\gamma_{\ell s}$ = 38 mN m^{-1},

$\theta = 115^{o}$

Young equation:

$\gamma_{sg} = \gamma_{s\ell} + \gamma_{\ell g} \cos\theta$

= 38 + 28.4 · cos 115 = 38 – 12 = 26 mN m^{-1}