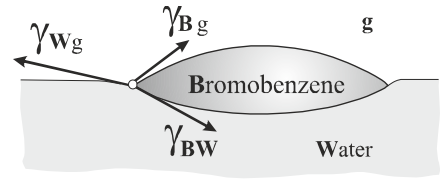


#### Problem 15-04 Spreading of a liquid on liquid surface

The surface tension of bromobenzene (B) at the temperature of 20°C is 35 mN m<sup>-1</sup> and its density has the value of 1.495 g cm<sup>-3</sup>, the surface tension and density of water (W) are 72.75 mN m<sup>-1</sup> and 0.9982 g cm<sup>-3</sup>, respectively. Interfacial tension between water and bromobenzene is 39 mN m<sup>-1</sup>.

Will a small amount of bromobenzene spread on the water surface or it will take the form of a lens?



$$[S_{B/W} = \gamma_{wg} - \gamma_{Bg} - \gamma_{BW} = -1.25 \text{ mN m}^{-1} < 0 \Rightarrow \text{bromobenzene does not spread}]$$

Solution:

$$\gamma_{Bg} = 35 \text{ mN m}^{-1}$$

$$\gamma_{wg} = 72.75 \text{ mN m}^{-1}$$

$$\gamma_{BW} = 39 \text{ mN m}^{-1}$$

$$S_{B/W} = \gamma_{wg} - \gamma_{Bg} - \gamma_{BW} = 72.75 - 35 - 39 = -1.25 \text{ mN m}^{-1} < 0 \dots \text{bromobenzene does not spread}$$