Assessment 6

A small bubble in a liquid is often used as an example of a capillary drop.

Questions:

1. What is the pressure inside the bubble (P) when it is submerged in a liquid (P) of density ρ and surface tension σ?

2. A bubble in water (ρ = 1000 kg/m³, σ = 72 × 10⁻⁵ N/m) has a radius of 0.1 mm. Calculate the pressure inside the bubble.

3. How does the pressure inside the bubble compare to the pressure outside the bubble?

4. If the bubble rises in water, does it expand or contract?

5. A bubble in a liquid of density ρ moves up in a liquid of density ρ₂. How does its volume change?

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Note the following:

(a) Hot spot theory
(b) Freeze-out of electronic field gradient access the bubble's surface
(c) Electrical theory
(d) Freeze-out of electronic field gradient access the bubble's surface
(e) Local hot spot from which the bubble's surface
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Calculation:

1. The pressure inside the bubble is given by

\[ P = P_0 + \frac{2\sigma}{r} \]

2. When the bubble rises in water, the pressure inside the bubble is lower than the pressure outside the bubble, causing the bubble to expand.

3. When the bubble moves up in a liquid of lower density, its volume increases.

4. When the bubble moves up in a liquid of higher density, its volume decreases.

5. The pressure difference between the inside and outside of the bubble depends on its radius and the properties of the liquid.